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UNIVERSITY OF ILLINOIS
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BULLETIN No. 141

RELATIVE EFFICIENCY OF DIFFERENT
RATIONS FOR FLESHING HORSES
FOR MARKET

By RUFUS C. OBRECHT



URBANA, ILLINOIS, NOVEMBER, 1909

SUMMARY OF BULLETIN No. 141

1. Some of the factors which determine the profits or losses resulting from fleshing horses for market are: The market class and grade selected; their initial cost; their soundness; the cost of feeds; the efficiency of the ration for producing gains; the methods employed in feeding; the length of time necessary to feed to secure the desired finish; the retaining of health and soundness of the horses during the feeding period, and the season marketed. Page 525

2. The object of these experiments was to compare different rations for fleshing horses for market, in which corn, oats, bran, oil meal, clover hay and timothy hay were used; and also, to determine the influence of exercise in taking on of flesh together with methods of stabling. Page 525

3. Plan.—Experiment No. 1 involved three lots of 6 horses each and each lot was fed a different ration for 84 days. Page 526

Experiment No. 2 involved four lots of 6 horses each and each lot was fed a different ration for 112 days. The horses in both experiments were appraised by a committee of experts at the beginning and again at the end of the experiment. Page 539

4. Gains.—The average daily gain per horse in experiment No. 1 varied from 1.88 pounds made by lot 3, to 2.98 pounds made by lot 2. Lot 2 made 30 percent more gains than lot 1, while lot 3 made 18 percent less than lot 1. Page 531

The average daily gain per horse in experiment No. 2 varied from 2.12 to 2.44 pounds made by lots 1 and 3 respectively. Page 543

The largest gain of a single horse in experiment No. 1 was made by No. 11 of lot 2, which gained 297 pounds in 84 days, or an average of 3.54 pounds per day. During the first 28 days he made a daily gain of 4.75 pounds. Page 532

The largest gains in experiment No. 2 was made by No. 48 of lot 2, which gained 363 pounds in 112 days, or an average of 3.24 pounds per day. Page 544

5. Because oil meal is an expensive feed and is used in small amounts with other grains it is very important in horse feeding that only the best quality should be used. Page 541

6. The horses receiving the clover hay in experiment No. 1 had better appetites, making it easier to keep them on feed, drank more water, were in better general thrift, and took on a better market finish than those receiving timothy hay. Page 534

There was no visible difference between the rations in experiment No. 2 so far as the effect on the market condition of the horses was concerned. The horses receiving corn and clover hay did not have as keen an appetite during the latter part of the experiment as those receiving corn, oats and clover hay. The horses receiving corn supplemented with bran and fed with clover hay tired of the bran during the last six weeks. Page 546

7. The horses getting exercise made 41 pounds less gain per head or an average of nearly $\frac{1}{2}$ pound less per day than those not getting exercise. Page 547

8. Seventeen horses in experiment No. 1 made an average gain of 192 pounds, which were worth 25.3 cents per pound, or a total of \$48.53. Page 535

Twenty horses in experiment No. 2 made an average gain of 257.7 pounds, which were worth 18 cents per pound, or a total of \$46.25. Page 548

9. The cost of producing gains with corn, bran and clover hay in experiment No. 1 was 8.5 cents per pound; with corn, oats, bran and clover hay was 7.4 cents; with corn, oats, bran and timothy hay was 12.1 cents. Page 537

The cost of producing gains with corn and clover hay in experiment No. 2 was 12 cents per pound; with $\frac{3}{4}$ corn and $\frac{1}{4}$ oats with clover hay it was 12.3 cents; with one-half oats and one-half corn with clover hay, 12.7 cents; with four-fifths corn and one-fifth bran with clover hay 12.4 cents. Page 549

10. Conclusions.....Page 553

RELATIVE EFFICIENCY OF DIFFERENT RATIONS FOR FLESHING HORSES FOR MARKET

BY R. C. OBRECHT, ASSISTANT CHIEF IN HORSE HUSBANDRY

INTRODUCTION

The fleshing of horses for market is a subject that has received but little consideration from investigators altho the business is one of considerable magnitude and importance thruout the middle west. The profits or losses resulting from this industry are determined by a number of factors, some of which are as follows: The market class and grade of horses selected; the initial cost of the horses; their soundness; the cost of feeds; the efficiency of the ration for producing gains; the methods employed in feeding; the length of time necessary to feed to secure the desired finish; the retaining of health and soundness of the horses during the feeding period; and the season when marketed.

It was found that most practical feeders follow the plan of using the feeds they can buy locally and then resorting to condiments, such as stock foods, "black strap" molasses, a cheap grade of brown New Orleans sugar, etc., for keeping up the appetite of their horses. Their opinion as to the efficiency and economy of feeds and appetizers used is most generally based simply upon personal observations. Because of these facts it was thought desirable to determine the relative value of some of the common feeding stuffs used thruout the State of Illinois.

OBJECT OF THE EXPERIMENTS

The main object of these experiments was to secure data for a comparison of rations for feeding horses, as follows: Corn and oil meal; corn, oats, and oil meal; corn, bran, and oil meal; corn, oats, bran, and oil meal; when fed in connection with clover hay, or with timothy hay, with respect to the following points:

1. The rapidity and extent of gains.
2. The economy of gains as measured by feed consumed.
3. The nature of the gains as affecting conformation and ultimately the commercial value.
4. The relative profit to the feeder after considering all items of expense and income.

Another object was to secure data upon the influence of exercise on horses in taking on of flesh together with methods of stabling.

Observations were also made in regard to the individuality of the horses used in the different lots in order to determine, if possible, the type and conformation best suited for feeding purposes; those making the largest gains as well as finishing into the most desirable market animals.

EXPERIMENT NO. 1

PLAN OF THE EXPERIMENT

In planning this experiment it was thought desirable to determine the relative efficiency of timothy hay and clover hay when each was fed in conjunction with corn, oats, bran, and oil meal, for the reason that a majority of farmers consider timothy hay the best roughage for work horses, and it is not uncommon to find some horse feeders using pure timothy or a mixed hay of timothy and clover in fleshing horses for market. A grain ration of corn, bran, and oil meal was also compared with one in which one-half the corn was replaced with oats and in both instances fed in conjunction with clover hay. Briefly stated then, the plan of the experiment was a direct comparison of corn with a mixed ration of corn and oats, and of clover hay with timothy hay, as rations for fleshing horses for market in an eighty-four day feeding period. If the preliminary feeding period were added to the eighty-four days it would make the entire period almost equal to the time usually required to put thin horses into marketable condition, which is from 100 to 120 days.

For convenience, the time was divided into three periods of twenty-eight days each. The initial weights of the horses were secured by weighing them on three consecutive days, and taking the average of the weights. In each instance the horses were weighed after they were fed grain and hay in the morning, but before they were watered. This same plan was carried out in securing the weights at the close of each period of twenty-eight days, the first weights being taken on the day prior, and the last weights on the day subsequent to the dates marking the close of the periods.

At the beginning of the experiment the horses were examined by a committee of expert horsemen, consisting of Mr. L. M. Newgass of the horse commission firm of Newgass & Son, Chicago, Mr. Nels Nelson of Paxton, a local dealer who buys for a Chicago sale stable, and Mr. C. E. Smith of Tuscola, an extensive, experienced feeder of heavy horses and a well known judge. Mr. Smith often consigns finished horses to the Chicago market.

This committee was asked to pass judgment as to the market value of the horses, taking as their standard country prices. They were also asked as to their judgment concerning the uniformity of the lots. This same committee (Mr. Newgass being absent) visited the University again at the close of the experiment and placed values on the horses in their finished form. The committee was asked to take a stationary market as their basis from which to work in order to avoid any unusual conditions that might arise thru market fluctuations and thus it was possible to secure data on the basis of a steady market. From the values assigned to the horses by this committee, all computations are made concerning profits or losses. The writer desires to acknowledge his indebtedness to these gentlemen for their gratuitous services which have been of great value and importance in this experiment.

STABLING AND WATERING

The horses were stabled in the basement of the general stock and storage barn of the University South Farm, which is better lighted and ventilated than the basement of the average barn of this kind. They were tied in single stalls, 4' 8" x 9' and kept there without exercise from the beginning of the experiment until the close, except on weigh days and at a few intervals when it was desirable to have them out for inspection. When weighed they did not walk more than fifteen rods in going to and returning from the scales.

The floor of the stable was paved with brick, with the exception of five stalls, which were earth. The mangers and feed boxes were of the usual kind, built of wood in one end of the stall, and the feed was taken in from the rear, beside the horse. It was originally intended to have water before them in pails at all times but after a short trial it was found that they would very soon befoul it and through their mischievousness, mash the pails! For this reason the plan was abandoned and for a short time they were given water five times daily. They did not drink enough at the second and fourth watering to justify the continuance of this plan, so for the remainder of the test they received water three times daily.

HORSES USED

Eighteen head of horses (five mares and thirteen geldings) were used in this experiment. They were divided into three lots of six horses each, and each horse was tagged with a numbered label. The division was made with the view of securing as nearly as possible uniform lots, considering size, conformation, quality and condition. One of these horses had been on the University farm and was just out of work, while the others were purchased in Central Iowa and Illinois. They were received at the University of Illinois from January 17 to 27, 1906. Nothing was known of the previous treatment or history of the horses, but judging from their appearance, probably most of them had not been stabled during the earlier part of the winter, but perhaps had been given the run of a stalk field and straw stack, which is the treatment often given to farm horses that are not used during the winter; a few, however, showed signs of better care. They were classed as eastern chunks, with two exceptions, these being a little smaller and lighter boned than the others, were classed as farm chunks.

They ranged in age from four to seven years, were sound, of good color (seven grays, seven bays, three browns, and one black), and apparently in good health when they arrived at the University farm. Judging from appearances, they had a greater percentage of Percheron blood than that of any other breed, altho there were evidences of Shire blood in some of them.

PRELIMINARY FEEDING.

The preliminary feeding lasted eleven to twenty-one days, varying according to the time of their arrival at the University. This seemed necessary in order to get the horses accustomed to their new condi-

tions and surroundings, and other matters adjusted. During this time they all received a ration composed of one-half corn, one-half oats, and clover hay. At first they received 12 pounds grain and 14 pounds clover hay per horse daily. Later the hay was increased to 16 pounds per horse daily, which amount they received up to February 6, the beginning of the experiment proper.

It may seem to the experienced feeder that the horses were started on rather heavy grain ration, but this was done because most of the horses had been receiving very liberal feeds of grain for several days before coming to the University; and also because of the practice of most horse feeders not requiring more than a week or ten days to get their horses to consume a maximum grain ration. In this experiment twenty-two to thirty-two days were required, including the preliminary feeding, to get the horses on full feed, or twelve days from the beginning of the experiment proper.

METHODS OF FEEDING AND RATIONS FED

The grain was divided into three feeds daily and given at 6 a. m., 11:30 a. m., and 5 p. m. The grain for each horse was weighed in pails for each feed. After getting the horses on full feed, the quantity of grain fed was determined by the time required for consuming it, and by the avidity of their appetite, they being required to clean up their trough before the next feed was given.

The hay was fed twice daily, morning and evening, and usually in equal amounts. Each feed was weighed separately in bags made for this purpose. They were given all they would consume, but were not allowed to waste any. When they did not consume what was given, it was weighed back and deducted from the amount fed; but this did not often occur.

Anticipating some difficulty in lot 3 (timothy hay horses), it was thought best to introduce some bran and keep salt before them at all times. This was done to avoid danger of colic, since timothy hay is rather constipating when fed with corn and oats to horses not receiving exercise. It was thought salt would stimulate thirst and a liberal consumption of water. This, together with the bran mash, served as a laxative and as a result, in the eighty-four days test only one case of colic occurred in the lot. For the sake of having the results comparable, bran was also introduced into the rations of lots 1 and 2. The quantity of bran fed was largely determined by the amount the horses in lot 3 would readily consume, which at most was 3 pounds daily. Some of the horses in lots 1 and 2 would not consume as much, hence the quantity fed to them was reduced. No. 7 of lot 1, toward the end of the experiment, became so affected by the laxative food that it became necessary to omit the bran mash.

The bran part of the ration was not introduced until a week after the beginning of the experiment, and was given in the form of a wet mash before the noon feed. The grain at this time was reduced in amount, equivalent to the dry bran fed.

Toward the close of the second period it seemed doubtful if the horses would be finished and free from their old hair by the time set

to close the experiment. This was especially true with the horses in lot 3. For this reason, it seemed desirable to introduce some oil meal into the ration of all the lots. It was fed during the last period only and the quantity was uniform in all the lots beginning with $\frac{1}{2}$ pound daily per horse, and increasing it to 1 pound per horse for the second week of the period. The third week, it was increased to $1\frac{1}{2}$ pounds and the fourth week to 2 pounds per head daily.

The rations fed were as follows:

- Lot 1. Corn, bran, oil meal (old process), clover hay.
- Lot 2. Corn, oats, bran, oil meal (old process), clover hay.
- Lot 3. Corn, oats, bran, oil meal (old process), timothy hay.

QUALITY AND COST OF FEEDS

The corn was a good quality of shelled No. 2 yellow. The oats were No. 2 white, and of good quality. The bran was of good grade from Minneapolis, Minnesota mills. The oil meal was old process meal, pea size. The clover hay was choice grade and free from dust (medium red variety). The timothy hay graded choice altho the quality was not quite as good as the clover.

The following were prevailing farm prices at the time the experiment was conducted, but other prices have been used showing how it modifies or changes the results.

Corn at 35c per bu. or.....	\$12.50	per ton
Oats at 30c per bu. or.....	18.75	"
Bran.....	20.00	"
Oil meal (O. P. pea size).....	27.00	"
Clover hay.....	8.00	"
Timothy hay.....	9.00	"

HEALTH AND THRIFT OF HORSES

The experiment had been in progress but eighteen days when two of the horses in lot 3, Nos. 17 and 18, had an attack of distemper (strangles). They were immediately isolated from the other horses and none of the others became affected. No. 17 had a light attack while No. 18 had it much more severely, and did not recover in time to continue in the experiment. By the end of the first period No. 17 was again on feed and consuming 14 pounds of corn and oats and 16 pounds of clover. As it was desirable, if possible, to keep her eating and from losing flesh during the attack, clover hay, being more palatable, was substituted for timothy. Because of the doubtful character of No. 17's condition after her sickness and an inequality in the average money values between lots 2 and 3, it was thought best to transfer No. 9 to lot 3 and No. 17 to lot 2. ¹ Up to this time No. 9 of lot 2 showed indications of being one of the best feeders, gaining 132 pounds during the first period. On account of the abnormal behavior of Nos. 9 and 17 from this time until the close of the experiment, the data from both these horses was rejected from the final results. In the last two periods No. 9 ate approximately an average amount of feed, but only made a total gain of 40 pounds. In the second and third periods No. 17 ate a little more than an average amount of feed and made a total gain of 250 pounds, as much as the average horse of

lot 2 made in the three periods. Had No. 17 been fed for twenty-eight days longer, it is fair to suppose that she would have maintained relatively the same ratio of gain as the average horses of lot 2, thus making 90 pounds more, since she always maintained a keen appetite.

No. 13 of lot 1 was also rejected from the final results as he made a total gain of only 80 pounds for the entire time, which is much below the normal. Evidently there must have been something wrong with this horse, as he weighed 10 pounds less at the end of the second period than he did at the beginning of that period. Later he was put on a ration of corn and oats, on which he seemed to thrive somewhat better.

No. 4 of lot 2 also had to be rejected. At the beginning of the third period he bruised his withers from rubbing in the stall and developed a fistula. Up to this time he made more than the average gain for the lot.

TABLE 1. AVERAGE DAILY RATION AND TOTAL FEED PER HORSE (POUNDS)

Lot No.	Feeds	Periods			Average Feb. 6 to May 1, '06 84 days	Total feed per horse Feb. 6 to May 1, '06 84 days
		(1) Feb. 6 to Mar. 6, '06 28 days	(2) Mar. 6 to Apr. 3, '06 28 days	(3) Apr. 3 to May 1, '06 28 days		
Lot 1 (5 horses)	Corn.	16.19	18.1	18.7	17.7	1483.4
	Bran.	2.15	2.8	2.14	2.37	198.7
	Oil meal. ...	.....	.....	1.23	.....	34.3
	Clover hay	17.16	13.49	10.95	13.86	1164.5
Lot 2 (4 horses)	Corn.	8.03	8.66	9.16	8.62	723.84
	Oats.	8.03	8.66	9.16	8.62	723.84
	Bran.	1.99	2.59	2.66	2.41	202.6
	Oil meal. ...	.....	.....	1.22	.....	34.1
Lot 3 (4 horses)	Clover hay.	17.00	14.01	10.12	13.73	1153.7
	Corn.	8.06	8.62	8.45	8.38	704.0
	Oats.	8.06	8.62	8.22	8.3	697.1
	Bran.	2.29	2.96	2.51	2.59	217.2
	Oil meal. ...	.....	.....	1.21	.....	34.0
	Timothy ..	16.92	14.74	12.42	14.69	1234.1

Table 1 gives the average daily ration per horse by periods, for the eighty-four days, and the total feed consumed per horse during the experiment. A careful study of the table will show that all the lots received approximately the same amount of feed daily, the most noticeable difference being in the smaller quantity of hay consumed by lots 1 and 2, which was less during the second and third periods than that of lot 3. While lot 3 consumed the most hay, it also consumed the least grain during the third period.

Table 1 also shows a gradual increase in the amount of grain consumed daily by all the lots. The increase is much more marked, however, in lots 1 and 2 than in lot 3. This was due to the fact that the horses in lots 1 and 2 maintained a much better appetite than those in lot 3 during the latter part of the experiment. Because of this it made it easier to regulate the ration of lots 1 and 2, as there was less danger

from over-feeding than there was with lot 3 (the horses getting timothy hay).

TABLE 2. AVERAGE DAILY RATION PER 1000 POUNDS LIVE WEIGHT

Lot No.	Feeds	Periods			Average for all periods Feb. 6 to May 1, '06 84 days
		(1) Feb. 6 to Mar. 6, '06 28 days	(2) Mar. 6 to Apr. 3, '06 28 days	(3) Apr. 3 to May 1, '06 28 days	
Lot 1	Corn.....	11.64	12.37	12.35	12.25
	Bran.....	1.55	1.91	1.41	1.64
	Oil meal.....	.....	.....	.81	.....
	Clover hay...	12.33	9.21	7.23	9.62
Lot 2	Corn.....	5.68	5.75	5.82	5.818
	Oats.....	5.68	5.75	5.82	5.818
	Bran.....	1.41	1.71	1.69	1.628
	Oil meal.....	.....	.....	.77	.....
Lot 3	Clover hay...	12.02	9.30	6.43	9.270
	Corn.....	5.97	6.17	5.85	5.99
	Oats.....	5.97	6.17	5.69	5.93
	Bran.....	1.70	2.12	1.74	1.85
	Oil meal.....	.....	.....	.84	.....
	Timothy.....	12.54	10.55	8.60	10.51

TABLE 3. AVERAGE WEIGHT AND GAIN PER HORSE BY PERIODS AND TOTAL GAINS

Lot No.	Feeds		Periods			Total gain Feb. 6 to May 1, '06 84 days
			(1) Feb. 6 to Mar. 6, '06 28 days	(2) Mar. 6 to Apr. 3, '06 28 days	(3) Apr. 3 to May 1, '06 28 days	
Lot 1	Corn.....	Wt. at beginning	1345	1437	1491	1345
	Bran.....	Wt. at end.....	1437	1491	1537	1537
	Oil meal.....	Lbs. gain.....	92	54	46	192
	Clover ...	Av. daily gain...	3.3	1.9	1.6	2.29
Lot 2	Corn (½)...	Wt. at beginning	1356	1472	1540	1356
	Oats (½)...	Wt. at end.....	1472	1540	1606	1606
	Bran.....	Lbs. gain.....	116	68	66	250
	Oil meal.....	Av. daily gain...	4.1	2.4	2.4	2.98
Lot 3	Clover ...	.....	.....	.....	.....	.....
	Corn (½)...	Wt. at beginning	1319	1379	1415	1319
	Oats (½)...	Wt. at end.....	1379	1415	1477	1477
	Bran.....	Lbs. gain.....	60	36	62	158
	Oil meal.....	Av. daily gain...	2.14	1.29	2.22	1.88
	Timothy ...	.....	.....	.....	.....	.....

Table 2 gives the average daily ration per thousand pounds live weight. When compared on this basis it will again be seen that lot 3 consumed more hay during the second and third periods than either of the other two lots. Lot 3 consumed nearly as much grain per thousand pounds live weight as lot 1, and slightly more than lot 2. While there was a gradual increase in quantity of grain consumed in the second and third periods, as shown in Table 1, it is interesting to note

that the total amount of feed consumed per thousand pounds live weight decreased as the experiment progressed.

Table 3 gives the average weight and gain per horse and the total gains during the experiment. It shows lot 2 to be 11 pounds heavier than lot 1, and 37 pounds heavier than lot 3 at the beginning of the experiment. This inequality in the initial weights between lots 2 and 3 is due largely to the fact that the two horses which were discarded from lot 3 were heavier than the average of the lot.

The most interesting part of this table is that which shows the gains made by the various lots. It will be noticed that the horses of lot 2 made an average gain of 250 pounds, or 58 pounds more than those of lot 1, and 92 pounds more than those of lot 3. Had No. 17 of lot 2 been fed for twenty-eight days longer and we were to add the estimated gain of 90 pounds to the 250 pounds of actual gain made, it would give a total gain of 340 pounds for the eighty-four days. This added to the total gains made by the four horses of lot 2, would give an average gain per horse of 268 pounds. When compared on a percentage basis lot 2 made 30 percent more gain than lot 1 while lot 3 made 18 percent less than lot 1. This helps to emphasize the striking difference in the relative efficiency of the rations of lots 2 and 3 for producing gains.

From these results we must conclude that, so far as gains are concerned, a mixed grain ration of corn and oats is superior to a straight corn ration when fed in conjunction with clover hay; and clover hay is much more valuable than timothy hay when fed in conjunction with corn and oats.

It is also interesting to note the extent of the gains of the various lots as made by periods. In lots 1 and 2, the largest gains were made during the first period, the gains gradually decreasing until the close of the experiment. This was not the case with lot 3, a probable reason for which will be given later. The average daily gain of the horses of lots 1 and 2 is considered very satisfactory, while that of lot 3 is not. The largest gains of any individual horse were made by No. 11 of lot 2 during the first period, in which he gained 133 pounds in twenty-eight days or an average of 4.75 pounds per day. No. 9 of lot 3, which was fed in lot 2 (on corn, oats, bran, and clover hay) for the first period, made a gain of 132 pounds, but in the next two periods, when fed on the same grain and on timothy hay, only made a total gain of 40 pounds, while No. 11, continuing on clover hay during the same time, made 164 pounds gain. Nos. 12 and 16 of lot 3 made the smallest gains of any of the horses in the experiment, an average of 135 pounds for the total time.

TABLE 4. POUNDS OF DRY MATTER PER POUND OF GAIN

Lot No.	Feb. 6 to Mar. 6, '06	Mar. 6 to Apr. 3, '06	Apr. 3 to May 1, '06	Average Feb. 6 to May 1, '06
Lot 1	9.393	15.57	17.61	13.1
Lot 2	7.352	12.21	12.024	9.907
Lot 3	14.332	23.683	12.957	15.923

In Table 4 which gives the pounds of dry matter per pound of gain, it will be noticed that where the gains were small the relative amount of dry matter was large, and that where the gains were large the amount of dry matter was small. This table serves in another way to emphasize the relative efficiency of the ration of lot 2 over that of lots 1 and 3.

TABLE 5. AVERAGE DRY MATTER AND DIGESTIBLE NUTRIENTS PER 1000 POUNDS LIVE WEIGHT PER DAY

Lot No.	Feeds		Periods			Average Feb. 6 to May 1, '06 84 days
			(1) Feb. 6 to Mar. 6, '06 28 days	(2) Mar. 6 to Apr. 3, '06 28 days	(3) Apr. 3 to May 1, '06 28 days	
Lot 1	Corn. . . .	Dry matter.	22.19	20.51	19.11	20.6
	Bran. . . .	Digest. protein. . .	1.6	1.51	1.58	1.56
	Oil meal. .	" carbohy. . .	13.04	12.48	11.77	12.43
	Clover . . .	" fat. . . . .	.917	.835	.889	.88
		Nut. ratio.	1:9.5	1:9.4	1:8.7	1:9.2
Lot 2	Corn (½) . .	Dry matter.	21.54	19.68	18.02	19.75
	Oats (½) . .	Digest. protein. . .	1.65	1.54	1.61	1.6
	Bran. . . .	" carbohy. . .	11.67	10.86	9.88	10.80
	Oil meal. .	" fat. . . . .	.778	.745	.752	.758
	Clover . . .	Nut. ratio.	1:8.1	1:8.1	1:7.2	1:7.8
Lot 3	Corn (½) . .	Dry matter.	22.77	21.8	19.88	21.48
	Oats (½) . .	Digest. protein. . .	1.33	1.36	1.45	1.38
	Bran. . . .	" carbohy. . .	12.26	12.55	11.38	12.06
	Oil meal. .	" fat. . . . .	.775	.776	.762	.771
	Timothy. .	Nut. ratio.	1:10.5	1:10.5	1:9.0	1:10.0

In finding the average dry matter and digestible nutrients consumed per thousand pounds live weight per day by periods, and for the average of all periods, the average weight of the horse was taken. In obtaining this average weight of the horse, the initial weight and final weight of the period, or the experiment, as the case may be, were added and the result divided by two.

By examining Table 5 it will be seen that the average daily dry matter decreases each succeeding period. While lot 2 made the largest total gains, it will be seen they consumed the smallest amount of dry matter per thousand pounds live weight; whereas, lot 3 made the smallest gains and consumed the largest amount of dry matter per thousand pounds live weight! This table also shows that lot 2 received more protein than either of the other lots and a smaller amount of carbohydrates. Lot 3 was the only one in which the total amount of protein received was gradually increased during each period. While lot 3 received more pounds of dry matter per thousand pounds live weight, it also received less digestible nutrients than lot 1, and less digestible protein than either lot 1 or lot 2. It will also be noticed that the nutritive ratio in all the lots gradually narrowed toward the end of

the experiment, and was considerably wider in lot 3 than in either of the other lots.

In Table 3 it was shown that lot 3 made slightly more gain in Period 3 than at any other time. They also received more protein during this period and a considerably narrower ration as is shown in Table 5. A reasonable explanation for the increased gain at this time is that these horses in lot 3 had not been receiving enough protein in the ration prior to this to permit of large gains, and with the addition of oil meal gave an increase in protein and also an increase in gain.

A brief review of the matter given indicates that a ration with a nutritive ratio of 1 to 8 is more efficient for producing gains with horses than one with a wider nutritive ratio. For the reason that timothy hay contains a small percent of protein, it is poorly suited as the roughage part of the ration, when fed in conjunction with corn and oats, for producing gains. Since oats contain more digestible protein than corn, and because it adds variety to the ration, it is a valuable adjunct to corn when fed with clover hay. It is fair to presume that it would prove even more valuable when fed with corn and timothy hay.

EFFECT OF RATION ON HORSES

It was noticeable from the beginning of the experiment to the close that the horses receiving the timothy hay never took on the filled appearance and let down in the barrel as did the horses receiving the clover hay. Those receiving the clover hay always had better appetites, making it easier to keep them on feed, drank more water, and were in better general thrift than those receiving timothy hay. The horses receiving clover hay also took on a better market finish. Those receiving the timothy hay were not well let down in the flank, and did not have that thick covering of flesh necessary to round out their bodies and make them highly appreciated on the market. All the horses, except Nos. 17 and 18, remained in good health thruout the experiment. So far as could be observed, clover hay was not more injurious to the wind of the horses than timothy hay.

Table 6 gives the valuation of the horses at the beginning and at the end of the experiment, based upon a stationary market, as agreed upon by the committee. It also shows the value of gains made to be worth from 19.5 cents to 26.6 cents per pound. The horses of lot 1 were valued \$8.00 higher at the beginning of the experiment than those of lot 2, and \$16.25 higher than those of lot 3. This inequality of initial valuation is due somewhat to the discarding of some of the horses from the final results. As originally made up, lot 1 had an average valuation of \$181.66; lot 2, \$176.66; and lot 3, \$175.00.

It will be noticed that lot 1 increased in value \$51.00 per horse; lot 2, \$48.75; and lot 3, \$35.00. Lot 1 and lot 2 were nearly enough equal to indicate that the rations of these lots were equally efficient for producing increase in value. The difference is due more to the individuality and sex of the horses than the efficiency of the ration,

since lot 1 had one mare and four geldings, while lot 2 had two mares and two geldings. Lot 3, which had three geldings and one mare, was decidedly lacking in finish, and the difference in the relative increased valuation illustrates pretty well what may be expected from the feeding of this ration.

A better basis from which to compute the value of gains is obtained by dividing the average increased valuation of the seventeen horses by the average gain in weight. Referring to the last line of Table 6, it will be seen that the increased valuation per horse was \$48.53, the average gain 192 pounds, and the value per pound of increased weight 25.3 cents.

TABLE 6. VALUE OF HORSES ON STATIONARY MARKET

Lot No.	Feeds	No. of horse	Feb. 24, '06 first valuation	May 1, '06 last valuation	Increase in value	Lb. in- crease in weight	Value per Lb. of increase weight
Lot 1	Corn. . .	1	\$ 215.00	\$ 260.00	\$ 45.00	....	.....
	Bran. . .	2	165.00	225.00	60.00	....	.....
	Oil meal.	3	200.00	240.00	40.00	....	.....
	Clover ..	6	190.00	260.00	70.00	....	.....
		5	170.00	210.00	40.00	....	.....
Total ...			940.00	1195.00	255.00	960	.....
Average			188.00	239.00	51.00	192	26.6c
Lot 2	Corn ($\frac{1}{2}$)	2	185.00	220.00	35.00	....	.....
	Oats ($\frac{1}{2}$)	15	200.00	265.00	65.00	....	.....
	Bran. . .	14	150.00	180.00	30.00	....	.....
	Oil meal.	11	185.00	250.00	65.00	....	.....
	Clover ..		.....	.....	.....	....	.....
Total ...			720.00	915.00	195.00	1000	.....
Average			180.00	228.75	48.75	250	19.5c
Lot 3	Corn ($\frac{1}{2}$)	12	185.00	200.00	15.00	....	.....
	Oats ($\frac{1}{2}$)	8	150.00	200.00	50.00	....	.....
	Bran. . .	10	165.00	190.00	25.00	....	.....
	Oil meal.	16	175.00	225.00	50.00	....	.....
	Timothy		.....	.....	.....	....	.....
Total ...			675.00	815.00	140.00	630	.....
Average			168.75	203.75	35.00	158	22.2c
Horses not used in expt.		13	150.00	190.00	40.00	80	.....
		9	215.00	235.00	20.00	170	.....
		17	170.00	265.00	95.00	250	.....
		18	160.00	240.00	80.00	170	.....
Total ...			695.00	930.00	235.00	670	.....
Grand total of all horses ...			\$3030.00	\$3855.00	\$825.00	3260	.....
Average of 17 horses.			\$178.24	\$226.76	\$48.53	192	25.3c

ITEMIZED FINANCIAL STATEMENT No. 1

(Per horse)

Lot 1

Expenditures

To 1 Horse at \$188.00.....	\$188.00
" 1483.4 lb. corn at 35c.....	9.27
" 198.7 lb. bran at \$20.00.....	1.99
" 34.3 lb. oil meal at \$27.00.....	.46
" 1164.5 lb. clover hay at \$8.00.....	4.66

Total expenditures \$204.38

Receipts

By 1 Horse.....	\$239.00
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Profit per horse..... \$34.62

Lot 2

Expenditures

To 1 Horse at \$180.00.....	\$180.00
" 723.84 lb. corn at 35c.....	4.52
" 723.84 lb. oats at 30c.....	6.79
" 202.6 lb. bran at \$20.00.....	2.03
" 34.1 lb. oil meal at \$27.00.....	.46
" 1153.7 lb. clover hay at \$8.00.....	4.61

Total expenditures \$198.41

Receipts

By 1 Horse.....	\$228.75
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Profit per horse..... \$30.34

Lot 3

Expenditures

To 1 Horse at \$168.75.....	\$168.75
" 704 lb. corn at 35c.....	4.40
" 697.1 lb. oats at 30c.....	6.54
" 217.2 lb. bran at \$20.00.....	2.17
" 34 lb. oil meal at \$27.00.....	.46
" 1234.1 lb. timothy hay at \$9.00.....	5.55

Total expenditures \$187.87

Receipts

By 1 Horse.....	\$203.75
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Profit per horse..... \$15.88

From financial statement No. 1, it will be seen that lot 1 netted the largest profit, being \$4.28 more per horse than lot 2, and \$18.74 more than lot 3. Results arrived at in this way might be accurate enough had a large number of animals been used in each lot. In this test, the number in each lot was too small, for the valuation of horses can only be approximated because we do not have an accurate standard from which to measure values, such as prevails in markets for cattle, hogs and sheep.

It is shown by the data taken from Table 6 that for an average of seventeen horses, the gains made were worth 25.3 cents per pound.

This factor should be fairly accurate because of the number of horses involved.

FINANCIAL STATEMENT No. 2

(Profit per horse based on pounds of gain)

Lot 1

Expenditures

To 1483.4 lb. corn at 35c.....	\$ 9.27
" 198.7 lb. bran at \$20.00.....	1.99
" 34.3 lb. oil meal at \$27.00.....	.46
" 1164.5 lb. clover hay at \$8.00.....	4.66

Total cost of feed \$ 16.38

Receipts

By 192 lb. gain at 25.3c.....	\$ 48.58
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Profit per horse.....\$ 32.20

Cost per pound gain 8.5 cents

Lot 2

Expenditures

To 723.84 lb. corn at 35c.....	\$ 4.52
" 723.84 lb. oats at 30c.....	6.79
" 202.6 lb. bran at \$20.00.....	2.03
" 34.1 lb. oil meal at \$27.00.....	.46
" 1153.7 lb. clover hay at \$8.00.....	4.61

Total cost of feed \$ 18.41

Receipts

By 250 lb. gain at 25.3c.....	\$ 63.25
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Profit per horse.....\$ 44.84

Cost per pound gain 7.4 cents

Lot 3

Expenditures

To 704 lb. corn at 35c.....	\$ 4.40
" 697.1 lb. oats at 30c.....	6.54
" 217.2 lb. bran at \$20.00.....	2.17
" 34 lb. oil meal at \$27.00.....	.46
" 1234.1 lb. timothy hay at \$9.00.....	5.55

Total cost of feed \$ 19.12

Receipts

By 158 lb. gain at 25.3c.....	\$ 39.97
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Profit per horse.....\$ 20.85

Cost per pound gain 12.1 cents

A brief consideration of financial statement No. 2 will show that when taken from the standpoint of gains, which is done in order to eliminate individuality, the ration fed lot 2 yielded a larger profit than that fed either of the other lots. While lot 2 gave the largest profits, based on pounds gain, it was also a more expensive ration than that fed lot 1, but not so expensive as that fed lot 3. The cost per pound gain made by lot 2 was less than either of the other lots due to the efficiency of the ration to produce larger gains. The cost per pound gain made

by lot 1 was 8.5 cents; lot 2, 7.4 cents; and lot 3, 12.1 cents, or 63 percent greater than that of lot 2.

No account has been taken of the labor involved in caring for the horses nor the bedding used. It has been assumed that the manure produced would offset this item of expense.

TABLE 7. NET PROFIT PER HORSE AND COST PER POUND OF GAIN WITH VARYING PRICES OF FEEDS

Feeds used and at varying prices	With increase gain at 25.3c per lb.	Lot 1	Lot 2	Lot 3
		Corn Bran Oil meal Clover	Corn ($\frac{1}{2}$) Oats ($\frac{1}{2}$) Bran Oil meal Clover	Corn ($\frac{1}{2}$) Oats ($\frac{1}{2}$) Bran Oil meal Timothy
Corn at 35c, oats at 30c, bran at \$20.00 per ton, oil meal at \$27.00 per ton, clover hay at \$8.00 per ton, timothy hay at \$9.00 per ton.	Net profit. . .	\$32.39	\$45.09	\$21.01
	Cost per pound of gain.	8.5c	7.4c	12.1c
Corn at 40c, oats at 35c, bran at \$22.00 per ton, oil meal at \$30.00 per ton, clover hay at \$8.00 per ton, timothy hay at \$9.00 per ton.	Net profit. . .	\$30.82	\$43.06	\$19.02
	Cost per pound of gain.	9.3c	8.2c	13.4c
Corn at 50c, oats at 45c, bran at \$24.00 per ton, oil meal at \$30.00 per ton, clover hay at \$8.00 per ton, timothy hay at \$9.00 per ton.	Net profit.	\$27.97	\$39.31	\$15.37
	Cost per pound of gain.	10.8c	9.7c	15.7c
Corn at 65c, oats at 55c, bran at \$26.00 per ton, oil meal at \$32.00 per ton, clover hay at \$11.00 per ton, timothy hay at \$12.00 per ton.	Net profit.	\$22.02	\$33.15	\$ 9.22
	Cost per pound of gain.	13.9c	12.4c	20.0c

It will be seen from Table 7, which gives the net profit per horse and cost per pound of gain with varying prices of feeds, that in every instance lot 2 would return the largest profit and make cheaper gains than any other lot.

With corn at 50 cents, oats at 45 cents and bran at \$24.00 per ton, there is still a nice profit to be made as is shown in the above statement. With such conditions, lot 2 would return \$11.34 or 41 percent more profit per horse than lot 1, and \$23.94 or 155 percent more profit per horse than lot 3. The higher in price the grain, the more profitable relatively would be the ration fed lot 2 because of its greater efficiency to produce gains than that fed lots 1 and 3. Even under such conditions, the rations fed all the lots would prove profitable, for it will be seen that lot 3, which received the least efficient ration, produced gains at a cost less than their value when produced.

EXPERIMENT NO. 2

PLAN OF THE EXPERIMENT

This experiment was planned to secure more data upon the results of mixing oats and bran with corn as compared with an all-corn ration, with clover hay as the roughage in each instance.

A comparison was also made of the effect of exercise with no exercise upon the taking on of flesh; some of the horses were given a walk of 2.8 miles daily, while others were kept in the barn without any exercise. Horses allowed the freedom of a box stall were also compared with others tied in single stalls without exercise.

The experiment extended over 112 days or four periods of 28 days each. The initial and final weights of each period were secured by taking the average of three consecutive daily weights, the same plan being used as in the previous experiment. The horses were appraised at the beginning and at the end of the experiment by a committee of expert horsemen. At the beginning of the experiment, the committee was composed of Messrs. T. V. Coffin of Champaign, Illinois, an extensive feeder and dealer in heavy horses, and Dan Sayer of the commission firm of E. H. Schloeman and Co., Chicago. It was intended to have the same committee do the appraising at the close of the experiment, but it was impossible to get the services of Mr. Sayer at that time and so Henry Piosa of the same firm substituted for him.

STABLING AND WATERING

The horses were stabled in the basement of the general stock and storage barn of the University South Farm, which is described under the above head in Experiment No. 1. Half, or 12 of the horses were tied in single stalls and the others were turned loose in box stalls about 12 x 14 feet. They were watered three times daily from pails, and given all the salt they would consume by keeping a small box of it in front of each horse.

HORSES USED

Twenty-four head of geldings varying in age from four to eight years were used in this experiment, and were divided into lots of six horses each. The horses were divided into as nearly uniform lots as possible considering size, conformation, age, quality, condition, and valuation. It will be seen that at the beginning of the experiment, lot 4 was about 40 pounds heavier than lots 2 and 3, and 66 pounds heavier than lot 1. The greater weight was due to size and ruggedness rather than better flesh. Each horse was given a number for identification, which was branded on his left front hoof.

They were native horses, just out of work, and were purchased from local dealers in central Illinois except two of the geldings, which had been used on the University Farm for more than two years. Most of them showed evidences of Percheron or Shire breeding tho a few had the characteristics of Belgian blood. Commercially they would have been rated on the market from "good" to "choice," and most of

them classed as light draft, while a few were eastern chunks. On the whole the horses used in this experiment were larger, better and more uniform than those used in the first experiment. When they arrived at the University, all of them were sound except one horse, which had a hip slightly down. Later some of them became injured, but at the end of the experiment they were appraised as sound in order to arrive at the value of the flesh taken on.

They were received at the University from September 15 to September 24, 1906, and were turned on rather short pasture without grain, excepting a small amount of green corn cut daily from the field. They remained out on pasture until October 18 when they were taken up and put into the barn preparatory to beginning the experiment.

It was not the intention to have the horses gain much while on pasture, but simply hold their own. The real purpose in putting the horses on pasture was not to secure gains but to tone up their systems and give all an equal chance when started on feed. It was thought that the above method would do it, but for some unaccountable reason they did not seem to thrive well for a month or more after being put into the barn. The writer thinks the trouble was in the pasture, for on the same farm similar difficulties have been experienced with broodmares and colts during the late summer and autumn months. It is believed that greater gains would have been secured had they never been turned onto pasture.

PRELIMINARY FEEDING

The preliminary feeding extended over a period of six days, the time considered necessary to accustom the horses to their new environment and get things adjusted for beginning the experiment proper. During this time they all received a ration of corn and clover hay, beginning with 12 pounds of grain and 16 pounds of hay daily, and gradually increasing the hay to 24 pounds daily.

METHODS OF FEEDING AND RATIONS FED

As in the previous experiment, the grain fed was divided into three feeds daily and given at 6 a. m., 11:30 a. m., and 5 p. m. The horses were not given a maximum grain ration until six weeks after the beginning of the experiment, the time being somewhat longer than in the previous test. From the beginning they were fed all the hay they would eat up clean, and the quantity gradually grew less as the grain was increased. The hay was fed twice daily, morning and evening and usually in equal amounts. All foreign matter such as corn stalks and waste hay (which only rarely occurred), was collected, weighed back, and deducted from the amount fed. Where a mixed grain ration was fed, a weighed quantity of the feed was prepared in the proper proportions and placed in a bin from which the feeding was done, and likewise a quantity of corn for lot 1. During the closing period of the experiment, a small quantity of oil meal was fed to put the hair in good condition. The rations fed were as follows:

- Lot 1. Corn, oil meal (old process), clover hay.
- Lot 2. Corn $\frac{3}{4}$, oats $\frac{1}{4}$, oil meal (old process), clover hay.
- Lot 3. Corn $\frac{1}{2}$, oats $\frac{1}{2}$, oil meal (old process), clover hay.
- Lot 4. Corn $\frac{4}{5}$, bran $\frac{1}{5}$, oil meal (old process), clover hay.

QUALITY AND COST OF FEEDS

The quality of the feeds used was the same as described in Experiment No. 1. The following were about the average farm prices of the feeds during the time when the experiment was conducted:

Corn at 43c per bu. or.....	\$15.36 per ton
Oats at 35c per bu. or.....	21.88 per ton
Bran at \$1.00 per cwt. or.....	20.00 per ton
Oil meal (O. P. pea size) at.....	27.00 per ton
Clover hay at.....	13.00 per ton

It will be noted that clover hay was excessively high, owing to the shortage of the crop. Other prices will be used in comparison with the above in order to show the results when the prices of feeds are varied.

HEALTH AND THRIFT OF HORSES.

As stated earlier, this experiment did not start off satisfactorily for some unaccountable reason. The data from three horses in the experiment were rejected (No. 33, lot 1, No. 37, lot 2, and No. 41, lot 4), because they did not thrive, and their gains were so small they were considered abnormal. There was nothing to indicate that these horses would not be good feeders but they failed to respond to the feed consumed. As it happened, lots 1, 3 and 4 each contained one of these unthrifty horses, while in lot 2 No. 36 died two and one-half months after the experiment began. A post-mortem examination failed to reveal the cause of the trouble, which was in the head and rendered breathing so difficult that a trachea tube was necessary to keep the horse alive for even a few hours. Up to this time No. 36 had been making more than average gains. The death of this horse and the rejection of three others left five horses in each lot. Horse No. 25 of lot 1 had a few attacks of colic which may have slightly prevented his making larger gains. He was below average in this respect, but the feeding of a heavy ration of whole corn may be partly accountable for the colic. All the other horses remained in good health, but during the third period they all received a set back caused by attempting to introduce some oil meal so unpalatable to them that they would not consume their grain when the oil meal was added. The following tables show the reduction in the amount of feed consumed at this time.

So far as was possible to observe, the horses not having exercise remained in as good health as those getting the daily walk of 2.8 miles.

From a study of Table 8 it will be seen that lot 1 ate less grain and hay than the other lots, while lot 4 ate slightly less hay than that consumed by lots 2 and 3. The table also shows a gradual increase in the amount of grain consumed in the first two periods and a falling off in all lots during the third period. This reduction is due to an attempt to introduce oil meal about the middle of the third period which caused all the horses to go off feed. After continued efforts to induce the horses to eat it in small quantities mixed with the regular grain ration, most of them became so averse to it that they would leave their grain when the oil meal was added. It is not known why

the horses disliked it unless it was new process meal. The stock of meal was new and not repulsive to cattle, nor did it seem objectionable to taste or smell. After about ten days some new oil meal was provided which was relished by the horses during the last or fourth period, when the grain was again materially increased.

The table shows the hay consumed was largest during the first period from which time it was gradually reduced up to the last or fourth period when it was again increased. It will be noted that the relative amount of bran was also reduced in lot 4 during the third and fourth periods. This was necessary owing to the fact that all of the horses of this lot showed signs of not relishing the bran before the end of the experiment, while some of them tired of it to the extent that they would refuse their corn when it was mixed with the normal amount of bran. By studying Table 9, which gives the average daily ration per thousand pounds live weight, it will be seen that when the different lots are compared on this basis there is less marked difference in the quantity of feed consumed than there appears to be in Table 8. The averages for all periods show that lot 3 used slightly more grain and hay per thousand pounds live weight than the other lots. In general, it will be seen that here, as in the previous experiment, tho not so marked, the total amount of feed consumed per thousand pounds of live weight decreased as the experiment progressed.

TABLE 8. AVERAGE DAILY RATION AND TOTAL FEED PER HORSE (POUNDS).

Lot No.	Feeds	Periods				Average for all periods 112 days	Total feed per horse Oct. 24, '06 to Feb. 13, '07 112 days
		(1) Oct. 24 to Nov. 21, '06 28 days	(2) Nov. 21 to Dec. 19, '06 28 days	(3) Dec. 19 to Jan. 16, '07 28 days	(4) Jan. 16 to Feb. 13, '07 28 days		
Lot 1 (5 horses)	Corn.	15.5	20.1	15.2	17.5	17.07	1911.6
	Oil meal. ....	.....	.....	.....	1.07	.27	30.
	Clover hay..	22.3	18.9	15.7	17.2	18.53	2075.2
	Total.	37.8	39.0	30.9	35.77	35.87	4016.8
Lot 2 (5 horses)	Corn.	11.8	15.8	14.6	14.95	14.29	1599.97
	Oats.	3.9	5.3	4.9	5.0	4.76	533.3
	Oil meal. ....	.....	.....	.....	1.25	.....	35.
	Clover hay..	23.6	21.7	15.5	16.46	19.3	2162.3
	Total.	39.3	42.8	35.0	37.66	38.35	4330.57
Lot 3 (5 horses)	Corn.	7.87	10.5	9.6	10.5	9.62	1077.1
	Oats.	7.87	10.5	9.6	10.5	9.62	1077.1
	Oil meal. ....	.....	.....	.....	1.2	.....	33.5
	Clover hay..	23.2	21.4	16.5	17.2	19.59	2194.1
	Total.	38.94	42.4	35.7	39.4	38.83	4381.8
Lot 4 (5 horses)	Corn.	12.6	15.96	15.7	20.3	16.14	1807.7
	Bran.	3.1	4.0	3.4	2.0	3.14	351.5
	Oil meal. ....	.....	.....	.....	1.2	.....	34.8
	Clover hay..	22.9	18.8	15.4	17.2	18.58	2080.8
	Total.	38.6	38.76	34.5	40.7	37.86	4274.8

TABLE 9. DAILY RATION PER 1000 POUNDS LIVE WEIGHT

Lot No.	Feeds	Periods				Average for all periods Oct. 24, '06 to Feb. 13, '07 112 days
		(1) Oct. 24 to Nov. 21, '06 28 days	(2) Nov. 21 to Dec. 19, '06 28 days	(3) Dec. 19 to Jan. 16, '07 28 days	(4) Jan. 16 to Feb. 13, '07 28 days	
Lot 1	Corn.	10.54	13.07	9.5	10.59	10.98
	Oil meal. ....	.....	.....	.....	.65	.....
	Cloverhay	15.23	12.27	9.79	10.44	11.92
	Total.	25.77	25.34	19.29	21.68	23.08
Lot 2	Corn.	7.79	9.93	8.89	8.79	8.92
	Oats.	2.59	3.31	2.96	2.93	2.97
	Oil meal. ....	.....	.....	.....	.73	.....
	Cloverhay	15.56	13.63	9.45	9.69	12.05
	Total.	25.94	26.87	21.30	22.14	23.94
Lot 3	Corn.	5.2	6.56	5.82	6.17	6.01
	Oats.	5.2	6.56	5.82	6.17	6.01
	Oil meal. ....	.....	.....	.....	.69	.....
	Cloverhay	15.33	13.38	10.00	10.11	12.24
	Total.	25.73	26.50	21.64	23.14	24.26
Lot 4	Corn.	8.20	9.98	9.47	11.84	9.91
	Bran.	2.05	2.49	2.08	1.15	1.93
	Oil meal. ....	.....	.....	.....	.72	.....
	Cloverhay	14.93	11.77	9.32	9.98	11.41
	Total.	25.18	24.24	20.87	23.69	23.25

TABLE 10. AVERAGE WEIGHT AND GAIN PER HORSE BY PERIODS, AND TOTAL GAINS

Lot No.	Feeds		Periods				Total gain Oct. 24, '06 to Feb. 13, '07 112 days
			(1) Oct. 24 to Nov. 21, '06 28 days	(2) Nov. 21 to Dec. 19, '06 28 days	(3) Dec. 19 to Jan. 16, '07 28 days	(4) Jan. 16 to Feb. 13, '07 28 days	
Lot 1	Corn.	Wt. at beginning.	1436	1499	1576	1629	1436
	Oil meal.	" " end.	1499	1576	1629	1674	1674
	Clover ...	Pounds gain.	63	77	53	45	238
		Av. daily gain....	2.25	2.75	1.89	1.61	2.12
Lot 2	Corn ($\frac{3}{4}$).	Wt. at beginning.	1468	1563	1620	1664	1468
	Oats ($\frac{1}{4}$).	" " end.	1563	1620	1664	1734	1734
	Oil meal.	Pounds gain.	95	57	44	70	266
	Clover ...	Av. daily gain....	3.39	2.04	1.57	2.50	2.38
Lot 3	Corn ($\frac{1}{2}$).	Wt. at beginning.	1463	1564	1635	1671	1463
	Oats ($\frac{1}{2}$).	" " end.	1564	1635	1671	1736	1736
	Oil meal.	Pounds gain.	101	71	36	65	273
	Clover ...	Av. daily gain....	3.61	2.54	1.29	2.32	2.44
Lot 4	Corn ($\frac{1}{5}$).	Wt. at beginning.	1502	1569	1630	1681	1502
	Bran ($\frac{1}{5}$).	" " end.	1569	1630	1681	1755	1755
	Oil meal.	Pounds gain.	67	61	51	74	254
	Clover ...	Av. daily gain....	2.39	2.18	1.82	2.64	2.26

A perusal of Table 10 shows lot one to be slightly lighter than lots 2 and 3, all of which were lighter than lot 4 at the beginning of the experiment. It did not seem possible to get the lots more evenly divided in weight without unbalancing the quality, which was wholly undesirable. The various lots seemed equal with regard to the amount of flesh that each might take on.

The horses in lot 3 made an average gain of 273 pounds, which is 7 pounds more than made by lot 2, 19 pounds more than lot 4, and 35 pounds more than made by lot 1. It will also be noticed that the highest average daily gain is 2.44 pounds, which is less than the best in Experiment 1, and not altogether satisfactory. However, the small gains may be accounted for in several ways: The horses did not start off feeding well from the first; later they were off feed for ten days due to an attempt to introduce into the ration oil meal, which they would not eat, and it will be noted that some of the horses in each lot were exercised daily and did not make as large gains as those not exercised. (See Table 13, page 546.)

From these results, we must conclude that a ration of corn supplemented with oats and fed in conjunction with clover hay is superior to an all-corn ration for producing gains tho the extent of gains is little influenced when the quantity of oats is not less than one-fourth and not more than one-half of the grain fed; and also, that a small quantity of bran mixed with corn and fed in conjunction with clover hay is superior to an all-corn ration for producing gains tho not as good as a mixed ration of corn and oats.

Lot 1 made its greatest gain during the second period, lots 2 and 3 made their greatest gain during the first period, while lot 4 made its greatest gain during the fourth period.¹ No. 48 in lot 2 made an average daily gain of 3.24 pounds, or a total gain of 363 pounds in the 112 days, which was larger than that made by any other horse in the experiment.

TABLE 11. POUNDS OF DRY MATTER PER POUND OF GAIN

Lot No.	Periods				Average Oct. 24, '06 to Feb. 13, '07
	(1) Oct. 24 to Nov. 21, '06	(2) Nov. 21 to Dec. 19, '06	(3) Dec. 19 to Jan. 16, '07	(4) Jan. 16 to Feb. 13, '07	
Lot 1.....	14.53	12.32	14.19	19.38	14.66
Lot 2.....	10.01	18.24	19.39	13.13	14.15
Lot 3.....	9.33	14.51	24.22	14.81	13.95
Lot 4.....	13.97	15.48	16.52	13.44	14.64

The economic use made of the feeds is brought out in Table 11, which shows lot 3 to have required the least dry matter to make a pound of gain; lot 2 is next in order, then lots 4 and 1, which are about the same. This helps to emphasize the fact that perhaps the rations of lots 2 and 3 were more palatable than that of lots 1 and 4, and with the result that a larger amount of feed was consumed and larger and more economical gains secured.¹ It will also be seen that the amount of dry matter per pound of gain is higher than that required in lots 1 and 2 in Experiment 1.

Table 12 gives the average daily dry matter and digestible nutrients per thousand pounds live weight, which shows that the amount of dry matter decreased as the experiment progressed and was noticeably less during the third and fourth periods.

In the average for the entire experiment lot 1 received slightly less dry matter than lot 4, and noticeably less than lot 2. Lot 3 consumed the largest amount of dry matter per thousand pounds live weight, and also made larger gains than any other lot in the experiment! The relative amount of gains made in the other lots is in the same proportion as the amount of dry matter consumed per thousand pounds live weight.

Table 12 also shows that lot 3, which made the largest gains, received the largest amount of digestible protein and the smallest amount of carbohydrate of all the lots, while lot 1, which received the smallest amount of digestible protein and next to the largest amount of digestible carbohydrates made the smallest gains of all the lots. In other words, this indicates that a ration with a nutritive ratio of 1:9.5 is too wide for best results in fleshing horses. We see here, as in Experiment 1, that the narrower the nutritive ratio, the larger the gains. Lot 4, however, is an exception; as will be seen it was fed a slightly narrower nutritive ratio than lot 2 and made 12 pounds less gain. This difference is so small that it is more likely to be due to the individuality of the horses than to the ration fed. It will also be seen that the nutritive ratio gradually widened in all lots until the

TABLE 12. AVERAGE DRY MATTER AND DIGESTIBLE NUTRIENTS PER 1000 POUNDS LIVE WEIGHT PER DAY

Lot No.	Feeds		Periods				Total Oct. 24, '06, to Feb. 13, '07 112 days
			(1) Oct. 24 to Nov. 21, '06 28 days	(2) Nov. 21 to Dec. 19, '06 28 days	(3) Dec. 19 to Jan. 16, '07 28 days	(4) Jan. 16 to Feb. 13, '07 28 days	
Lot 1	Corn	Dry matter	22.16	22.04	16.76	18.87	19.96
	Oil meal . .	Digest. protein . .	1.54	1.55	1.17	1.46	1.43
	Clover . . .	carbohyd.	12.77	13.32	10.02	11.19	11.83
	"	eth. extr. . . . .	.79	.87	.65	.76	.77
		Nut. ratio	1:9.5	1:9.9	1:9.9	1:8.8	1:9.5
Lot 2	Corn ($\frac{3}{4}$) . .	Dry matter	22.42	23.34	18.56	19.32	20.91
	Oats ($\frac{1}{4}$) . .	Digest. protein . .	1.58	1.68	1.36	1.57	1.55
	Oil meal . .	carbohyd.	12.33	13.36	10.91	11.17	11.94
	Clover . . .	" eth. extr. . . . .	.77	.88	.73	.78	.79
		Nut. ratio	1:8.9	1:9.1	1:8.3	1:8.3	1:8.9
Lot 3	Corn ($\frac{1}{2}$) . .	Dry matter	22.25	23.01	18.84	20.19	21.07
	Oats ($\frac{1}{2}$) . .	Digest. protein . .	1.61	1.71	1.42	1.67	1.60
	Oil meal . .	carbohyd.	11.80	12.61	10.47	11.14	11.50
	Clover . . .	" eth. extr. . . . .	.75	.84	.71	.79	.77
		Nut. ratio	1:8.3	1:8.4	1:8.5	17.7	1:8.2
Lot 4	Corn ($\frac{4}{5}$) . .	Dry matter	21.76	21.08	18.18	20.68	20.42
	Bran ($\frac{1}{5}$) . .	Digest. protein . .	1.57	1.57	1.36	1.66	1.54
	Oil meal . .	carbohyd.	11.96	12.12	10.67	12.34	11.68
	Clover . . .	" eth. extr. . . . .	.73	.78	.69	.85	.76
		Nut. ratio	1:8.7	1:8.8	1:9	1:8.6	1:8.8

last period, where it is perceptibly narrower, due to the feeding of oil meal. The nutritive ratio gradually widened at first due to the fact that the horses ate less clover hay and more grain as the experiment progressed. The small amount of nutrients fed during the third period is due to the horses being off feed for about ten days at the time when an attempt was made to introduce poor oil meal.

Table 10 shows the gains made in lots 2, 3 and 4 to be less during the second period than during the first period, and still less during the third period than during the second period. During the last or fourth period the gains are increased over those of the third period. This helps to emphasize the fact again that as the experiment progressed and the nutritive ratio became wider, the gains decreased until the last period when oil meal was introduced making a narrower nutritive ratio when they again increased. The behavior of lot 1 was abnormal in this respect, the reason for which is unaccountable.

A brief review of the results obtained in this experiment seem to justify some of the conclusions reached in Experiment 1, that a ration with a nutritive ratio of 1:8 is more satisfactory for producing gains in fleshing horses than one with a wider nutritive ratio.

So far as the effect on the market condition of the horses was concerned, there was no visible difference between the rations. The horses in lot 1, receiving corn and clover hay, did not have as keen an appetite during the latter part of the experiment as those of lots 2 and 3, which received corn, oats and clover hay. The horses in lot 4, receiving corn, bran and clover hay, ate nearly as much as those of lots 2 and 3, but during the last six weeks of the experiment it was easy to see that they were becoming tired of the bran, and consequently the proportion had to be reduced from $\frac{1}{5}$ to whatever amount they would consume, which with some of the horses was almost nothing, while others would take $\frac{1}{4}$ the entire amount of grain fed.

EFFECT OF EXERCISE

The effect of exercise upon the taking on of flesh is shown in the following table:

TABLE 13. EXERCISE VS. NO EXERCISE

Kind of treatment	Number of horses	Weight, Lb., Oct. 24, '06	Weight, Lb., Jan. 16, '07	Av. gain Lb., 84 days	Average daily gain, Lb.
Exercise	7	1507	1675	168	2
No exercise	13	1446	1655	209	2.49

The horses getting exercise were walked 2.8 miles daily for a period of 84 days from the first of the experiment. Eight horses were given this exercise daily, but only seven are included in the average as one horse was rejected as being abnormal in that he made a very slight gain. There were sixteen horses which did not get exercise, two of which were rejected owing to the fact that they did not thrive, and another one died, leaving only 13 horses from which the average has been computed. As much care as possible was used in making the selection of horses with which to test the effect of exercise. Half of them were stabled in box stalls and the other half in single stalls

and tied up. Two horses from each lot were selected for exercise, one from a box stall and another from a single stall. This left twice as many to remain in the barn without exercise. Because the roads were bad from being very muddy or frozen and very rough, the exercise was discontinued at the end of the third period.

In Table 13, it will be seen that the horses getting exercise made 41 pounds less gain per head or an average of nearly $\frac{1}{2}$ pound less per day than those not getting exercise. So far as could be observed, the horses not having exercise remained in as good health and retained their appetite as well as those given exercise. It was not possible to follow these horses up after they were marketed in order to see what the ultimate results would be, as many of them were purchased by dealers on the market and taken to different parts of the country.

EFFECT OF BOX STALL

As stated above, one-half of the horses were stabled loose in box stalls, while the other half were tied in single stalls where no exercise could be taken.

The following table gives the results of this test:

TABLE 14. SINGLE STALL *vs.* BOX STALL

Kind of stall	Number of horses	Weight, Lb., Oct. 24, '06	Weight, Lb., Jan. 16, '07	Av. gain, Lb., 84 days	Daily gain, Lb.
Single stall.	10	1454	1656	202	2.4
Box stall.	10	1481	1667	186	2.2

From the above table, it will be seen that the horses tied up in the single stalls made better gains by .2 pound per day than those having the freedom of box stalls. This illustrates again the detrimental effect of exercise upon the taking on of flesh. It has been claimed by some men that the box stall offers an advantage in helping to prevent bog spavins and thoroughpins. The writer could detect no difference in favor of the box stall in this regard. It does help, however, to prevent accidents, as horses are not so likely to become injured from being kicked by adjoining stall companions. The box stall has the disadvantage of being more expensive in its initial cost and requires more room so that fewer horses can be accommodated, which is often an important item. The labor involved in caring for the horses is also greater where the box stall is used.

Table 15 gives individual gains, and shows that the horses in single stalls made greater gains in 84 days than those in box stalls, in both instances, where they received exercise and with no exercise. The evidence shown here in favor of the single stall where the horses received exercise is not sufficient to be conclusive, as too few horses were involved, but it does seem to corroborate the results obtained with a larger number of animals including the horses receiving no exercise. It would seem safe to conclude that there is nothing to be gained by the use of the box stall so far as it may influence the horse in taking on flesh.

The valuation of the individual horses at the beginning and end of the experiment as assigned by the appraising committee, based

TABLE 15. INDIVIDUAL GAINS MADE BY HORSES IN 84 DAYS (POUNDS)

Lot No.	Exercise			No exercise		
	Horse No.	Single stall	Box stall	Horse No.	Single stall	Box stall
Lot 1	30	...	116	22	...	225
	...	...	...	25	...	120
	...	...	...	27	280	...
	...	...	...	32	224	...
Lot 2	28	...	183	24	...	211
	46	189	...	43	130	...
	...	...	...	48	...	270
Lot 3	38	...	133	35	254	...
	23	188	...	42	...	253
	...	...	...	49	213	...
Lot 4	31	172	...	34	177	...
	39	...	193	44	...	159
	...	...	...	47	198	...
Total		549	625	1476		1238
Average		183	156	211		206

TABLE 16. APPRAISED VALUATION OF HORSES

Lot No.	Feeds	No. of horse	First valuation	Last valuation	Increas'd valuation	Lb. increase in weight	Value per lb. of increased wt.
Lot 1	Corn.	22	\$235.00	\$275.00	\$40.00	...	.....
	Oil meal. ...	25	210.00	210.00	.....	...	.....
	Clover.	27	215.00	300.00	85.00	...	.....
		30	215.00	275.00	60.00	...	.....
		32	185.00	220.00	35.00	...	.....
	Av ...		212.00	256.00	44.00	238	18.5c
Lot 2	Corn ($\frac{3}{4}$) ..	24	235.00	290.00	55.00	...	.....
	Oats ($\frac{1}{4}$) ..	28	200.00	255.00	55.00	...	.....
	Oil meal. ...	43	235.00	250.00	15.00	...	.....
	Clover.	46	225.00	275.00	50.00	...	.....
		48	200.00	280.00	80.00	...	.....
	Av ...		219.00	270.00	51.00	266	19.2c
Lot 3	Corn ($\frac{1}{2}$) ..	23	240.00	235.00	-5.00	...	.....
	Oats ($\frac{1}{2}$) ..	35	210.00	255.00	45.00	...	.....
	Oil meal. ...	38	185.00	235.00	50.00	...	.....
	Clover.	42	235.00	310.00	75.00	...	.....
		49	215.00	260.00	45.00	...	.....
	Av ...		217.00	259.00	42.00	273	15.4c
Lot 4	Corn ($\frac{4}{5}$) .	31	225.00	265.00	40.00	...	.....
	Bran ($\frac{1}{5}$) .	34	225.00	270.00	45.00	...	.....
	Oil meal. ...	39	225.00	265.00	40.00	...	.....
	Clover.	44	225.00	275.00	50.00	...	.....
		47	185.00	250.00	65.00	...	.....
	Av ...		217.00	265.00	48.00	254	18.9c
Grand total.			4325.00	5250.00	925.00	1031	.....
Average 20 horses.			216.25	262.50	46.25	257.7	18c

upon a stationary market is given in Table 16. The table also shows the average increased valuation per horse for the different lots, and the average for all the lots. It will be seen from the above table that the horses of lot 2 increased in valuation from the beginning to the end of the experiment an average of \$51.00, which is \$3.00 more than the horses of lot 4, \$7.00 more than lot 1, and \$9.00 more than lot 3, the lot which made the largest gains. The table also shows the increased flesh was worth 18.5c per pound in lot 1, 19.2c in lot 2, 15.4c in lot 3 and 18.9c in lot 4.

Owing to the difficulty of assigning accurate values to horses, it must be understood that it is a very easy matter to rate some horses a little too high and others a little too low. Because of this fact and the small number involved in each lot, it is not safe to attach great weight to the figures giving the value of flesh in the different lots, but the average of all horses in the experiment is a much safer basis from which to make computations. It will then be seen that an average of the twenty horses increased \$46.25 each, or at the rate of 18c per pound for each pound of flesh taken on.

It will also be noticed that the horses in lot 1 were appraised \$5.00 lower per head at the beginning of the experiment than the horses of lots 3 and 4, and \$7.00 lower than the horses of lot 2. The horses of lot 1 were somewhat smaller at the beginning of the experiment than those of the other lots, which in a measure may account for their being rated at a lower value. So far as the efficiency of the rations in producing finish are concerned, there was but little difference in any of the lots. If there was any difference, it was in favor of lots 2, 3 and 4 over that fed lot 1 (corn and clover hay).

ITEMIZED FINANCIAL STATEMENT NO. 1

(Profit per horse based on pounds of gain)

<i>Expenditures</i>		Lot 1
To	1911.6 lb. corn at 43c.....	\$14.68
"	30 lb. oil meal at \$27.00.....	.40
"	2075.2 lb. clover at \$13.00.....	13.49
		<hr/>
		Total cost of feed \$28.57

<i>Receipts</i>		Total cost of feed \$28.57
By	238 lb. gain at 18c.....	\$42.84
		<hr/>
		Profit per horse.....\$14.27

Cost per pound gain 12 cents

<i>Expenditures</i>		Lot 2
To	1600 lb. corn at 43c.....	\$12.29
"	533.3 lb. oats at 35c.....	5.83
"	35 lb. oil meal at \$27.00.....	.47
"	2162.3 lb. clover at \$13.00.....	14.05
		<hr/>

Total cost of feed \$32.64

<i>Receipts</i>		Total cost of feed	\$32.94
By	266 lb. gain at 18c.....		\$47.88
			<hr/>
		Profit per horse.....	\$15.24

Cost per pound gain 12.3 cents

LOT 3

Expenditures

To	1077.1 lb. corn at 43c.....	\$ 8.27
"	1077.1 lb. oats at 35c.....	11.78
"	33.5 lb. oil meal at \$27.00.....	.45
"	2194.1 lb. clover at \$13.00.....	14.26

Total cost of feed \$34.76

Receipts

By	273 lb. gain at 18c.....	\$49.14
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Profit per horse.....\$14.38

Cost per pound gain 12.7 cents

LOT 4

Expenditures

To	1807.7 lb. corn at 43c.....	\$13.88
"	351.5 lb. bran at \$20.00.....	3.52
"	34.8 lb. oil meal at \$27.00.....	.47
"	2080.8 lb. clover at \$13.00.....	13.53

Total cost of feed \$31.40

Receipts

By	254 lb. gain at 18c.....	\$45.72
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Profit per horse.....\$14.32

Cost per pound gain 12.4 cents

The cost of feeding the horses as given in financial statement No. 1, is based upon commercial prices of feeds at the time the experiment was conducted. No charge is made for labor in caring for the horses nor for bedding, neither is any value assigned to the manure made by the horses. It has been assumed that the value of the manure would be enough to offset the cost of the labor involved and the bedding used. From this table it will be seen that lot 2 returned slightly the largest profit, tho there is only 97 cents difference per horse between lot 2 and lot 1, which returned the smallest profit. The cost of feeding lot 3 was \$6.19 more per horse than that of lot 1, which is due to the use of oats in the ration of lot 3. While the ration of lot 3 cost more than that of any other lot, it also made larger gains, but the gains were not sufficiently large to justify the high cost of the ration. It will be noticed that the gains of lot 1 cost 12c per lb., while that of lot 2, 12.3c, that of lot 3, 12.7c, and lot 4, 12.4c. Stated in another way and with the above conditions, 85 cents per bushel was realized for the corn fed lot 1; 88 cents for the corn, and 50 cents for the oats fed lot 2; 89 cents for the corn, and 51 cents for the oats fed lot 3, and 88 cents for the corn fed lot 4.

With varying prices of feeds Table 17 gives a summarized statement of the net profit per horse and cost per pound of gain. With moderate priced feeds (corn at 40c, oats at 32c, bran at \$20.00 per ton, oil meal at \$27.00 per ton and clover hay at \$8.00 per ton) it shows that lot 2 would return the greatest profit netting \$22.01, which is \$1.52 more than that of lot 1. While lot 1 would net the smallest profit it would make gains at a cost of 9.4c per pound, which is cheaper

than that of any other lot. As the prices of feeds advance the cost per pound of gain also increases, but even with very high priced feeds the cost per pound of gain would be less and the profits greater with lot 1 than that of any other lot.

TABLE 17. NET PROFIT PER HORSE AND COST PER POUND OF GAIN WITH VARYING PRICES OF FEEDS

Feeds used and at varying prices	With increase gain at 18c per lb.	Lot 1	Lot 2	Lot 3	Lot 4
		Corn Oil meal Clover hay	Corn ($\frac{3}{4}$) Oats ($\frac{1}{4}$) Oil meal Clover hay	Corn ($\frac{1}{2}$) Oats ($\frac{1}{2}$) Oil meal Clover hay	Corn ($\frac{4}{5}$) Bran ($\frac{1}{5}$) Oil meal Clover hay
Corn at 43c, oats at 35c, bran at \$20.00 per ton, oil meal at \$27.00 per ton, clover hay at \$13.00 per ton.	Net profit.	\$14.27	\$15.24	\$14.38	\$14.32
	Cost per lb. of gain..	12c	12.3c	12.7c	12.4c
Corn at 40c, oats 32c, bran \$20.00 per ton, oil meal \$27.00 per ton, clover hay \$8.00 per ton	Net profit.	\$20.49	\$22.01	\$21.45	\$20.50
	Cost per lb. of gain..	9.4c	9.7c	10.1c	9.9c
Corn at 50c, oats 45c, bran \$24.00 per ton, oil meal \$30.00 per ton, clover hay \$8.00 per ton	Net profit.	\$17.02	\$16.93	\$15.10	\$16.24
	Cost per lb. of gain..	10.8c	11.6c	12.5c	11.6c
Corn at 60c, oats at 50c, bran at \$25.00 per ton, oil meal at \$32.00 per ton, clover hay at \$10.00 per ton	Net profit.	\$11.51	\$11.04	\$ 9.26	\$11.01
	Cost per lb. of gain..	13.2c	13.8c	14.6c	13.7c
Corn at 70c, oats at 60c, bran at \$26.00 per ton, oil meal at \$34.00 per ton, clover hay at \$12.00 per ton	Net profit.	\$ 5.99	\$ 4.32	\$ 1.75	\$ 5.48
	Cost per lb. of gain..	15.5c	16.4c	17.4c	15.8c

Financial statement No. 2 shows what would happen with moderate priced feeds and the flesh produced worth 25c per pound as in Experiment No. 1. From the statement, it will be seen that lot 3 shows the greatest profit per horse by \$3.60 more than lot 1, 12 cents more than lot 2, and \$2.47 more than lot 4. The cheapest gains would be made in lot 1 at 9.4c per pound, and the most expensive in lot 3 at a cost of 10.1c per pound. The greater profit in lots 2 and 3 is due to the greater gains made being worth 25c per pound, while the cost of production in all the lots is very nearly the same. Where such is the case, the farmer would receive \$1.50 per bushel for his corn, and 86c per bushel for his oats, and at the same time help maintain the fertility of his soil by the manure produced.

ITEMIZED FINANCIAL STATEMENT No. 2
(Profit per horse based on pounds of gain)
Lot 1

<i>Expenditures</i>	
To 1911.6 lb. corn at 40c.....	\$13.65
" 30 lb. oil meal at \$27.00.....	.40
" 2075.2 lb. clover hay at \$8.00.....	8.30
	<hr/>
Total cost of feed	\$22.35

<i>Receipts</i>	
By 238 lb. gain at 25c.....	\$59.50
	<hr/>
Profit per horse.....	\$37.15

Cost per pound gain 9.4 cents

Lot 2

<i>Expenditures</i>	
To 1600 lb. corn at 40c.....	\$11.42
" 533.3 lb. oats at 32c.....	5.33
" 35 lb. oil meal at \$27.00.....	.47
" 2162.3 lb. clover hay at \$8.00.....	8.65
	<hr/>
Total cost of feed	\$25.87

<i>Receipts</i>	
By 266 lb gain at 25c.....	\$66.50
	<hr/>
Profit per horse.....	\$40.63

Cost per pound gain 9.7 cents

Lot 3

<i>Expenditures</i>	
To 1077.1 lb. corn at 40c.....	\$ 7.69
" 1077.10 lb. oats at 32c.....	10.77
" 33.5 lb. oil meal at \$27.00.....	.45
" 2194.1 lb. clover hay at \$8.00.....	8.78
	<hr/>
Total cost of feed	\$27.69

<i>Receipts</i>	
By 273 lb. gain at 25c.....	\$68.44
	<hr/>
Profit per horse.....	\$40.75

Cost per pound gain 10.1 cents

Lot 4

<i>Expenditures</i>	
To 1807.7 lb. corn at 40c.....	\$12.91
" 351.5 lb. bran at \$20.00.....	3.52
" 34.8 lb. oil meal at \$27.00.....	.47
" 2080.8 lb. clover hay at \$8.00.....	8.32
	<hr/>
Total cost of feed	\$25.22

<i>Receipts</i>	
By 254 lb. gain at 25c.....	\$63.50
	<hr/>
Profit per horse.....	\$38.28

Cost per pound gain 9.9 cents

CONCLUSIONS

1. A mixed grain ration of corn and oats, when fed with clover hay, is more efficient than a single grain ration of corn for producing large gains in an eighty-four day feeding period.

2. While a ration of corn, oats, and clover hay is more expensive with prices of feeds as stated, than one of corn and clover hay, the gains are such as to make its use more economical.

3. Clover hay when fed with a mixed grain ration of corn and oats is more efficient for producing gains than timothy hay. In this test clover hay produced 58 percent more gains than timothy.

4. A ration of corn, oats and timothy is not satisfactory for producing finish in fleshing horses for market, but may be materially improved by the addition of oil meal.

5. Experiment No. 2 showed but little difference in the efficiency of a ration of corn and oats where the oats fed equalled only one-fourth the amount of corn and where the oats and corn were fed in equal quantities by weight, with clover hay as roughage in each ration.

6. A ration of one-fourth oats and three-fourths corn proved more economical than one of half oats and half corn.

7. A ration of corn and bran fed in proportions of one part bran to four parts corn by weight is superior to an all-corn ration for producing gains when fed in conjunction with clover hay.

8. This test seemed to indicate that there is danger of feeding too much bran for best results when clover hay furnishes the roughage part of the ration. The bran and clover combined produced a too laxative condition.

9. A ration with a nutritive ratio of 1:10 is too wide for best results in fleshing horses. In these tests the narrower the nutritive ratio the larger the gains. Best results were secured with a nutritive ratio of 1:8.

10. Exercise has a retarding effect upon the taking on of flesh. In this test the horses receiving no exercise made 24 percent more gains than those having a daily walk of 2.8 miles.

11. While box stalls are safer than single stalls for stabling horses, they are also more expensive and do not offer merits not possessed by single stalls so far as they may influence the horse in taking on flesh. The horses stabled in single stalls made 16 pounds or 8 percent more gains in 84 days than those in box stalls.

12. Thin horses of some market classes will not return as large a profit in feeding as those of other classes. The kind of horses it will pay best to feed depends partially upon the season of the year when marketed. All heavy horses will pay better than light horses, and good and choice animals better than those of the lower grades.

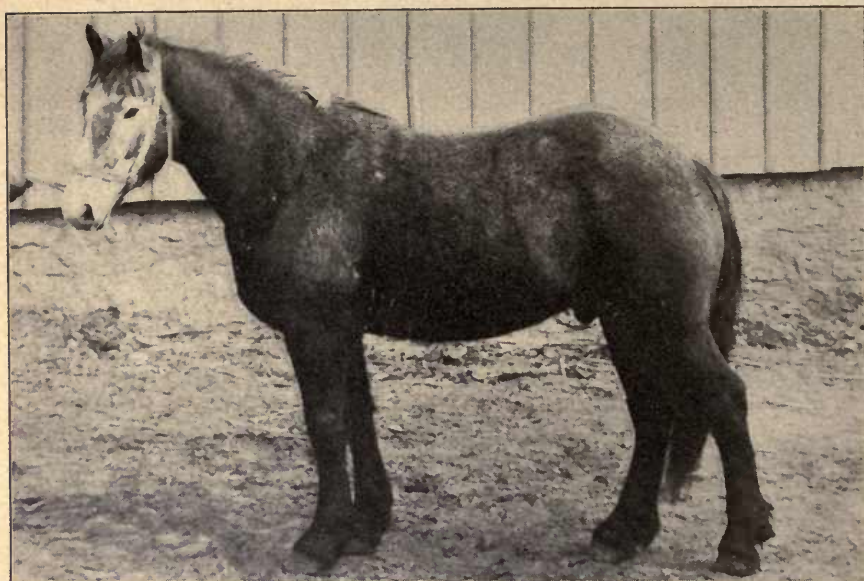


PLATE 1. NO. 6. BEFORE FEEDING. EXPERIMENT 1, LOT 1.

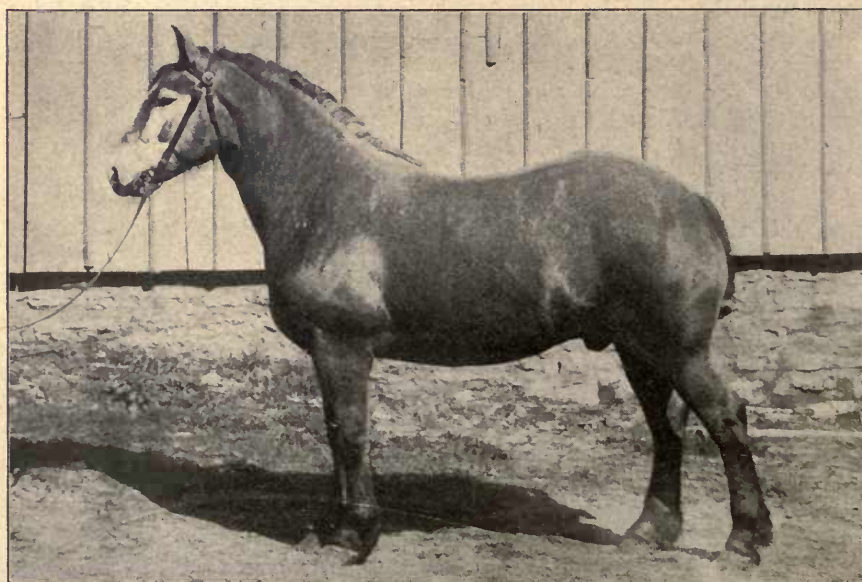


PLATE 2. NO. 6. AFTER FEEDING. EXPERIMENT 1, LOT 1

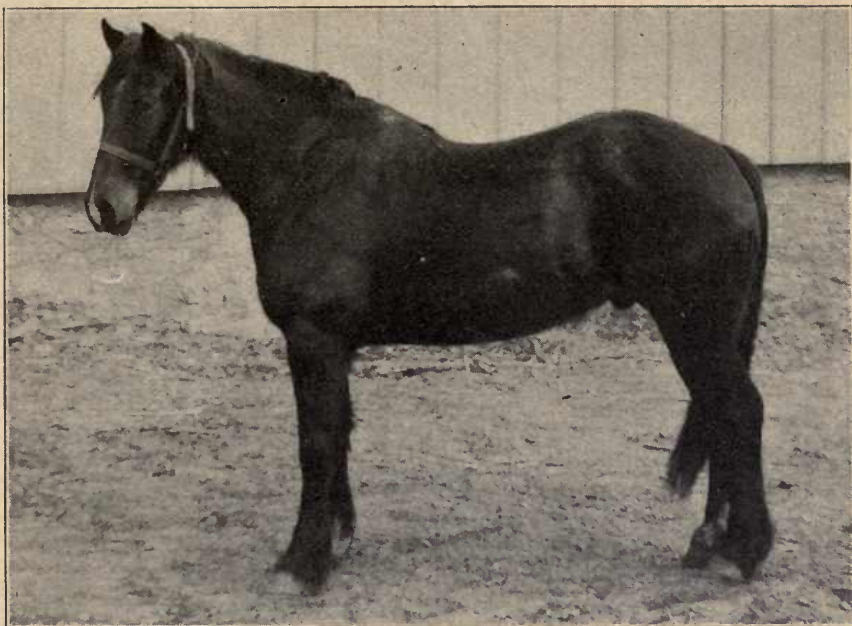


PLATE 3. No. 11. BEFORE FEEDING. EXPERIMENT 1, LOT 2.

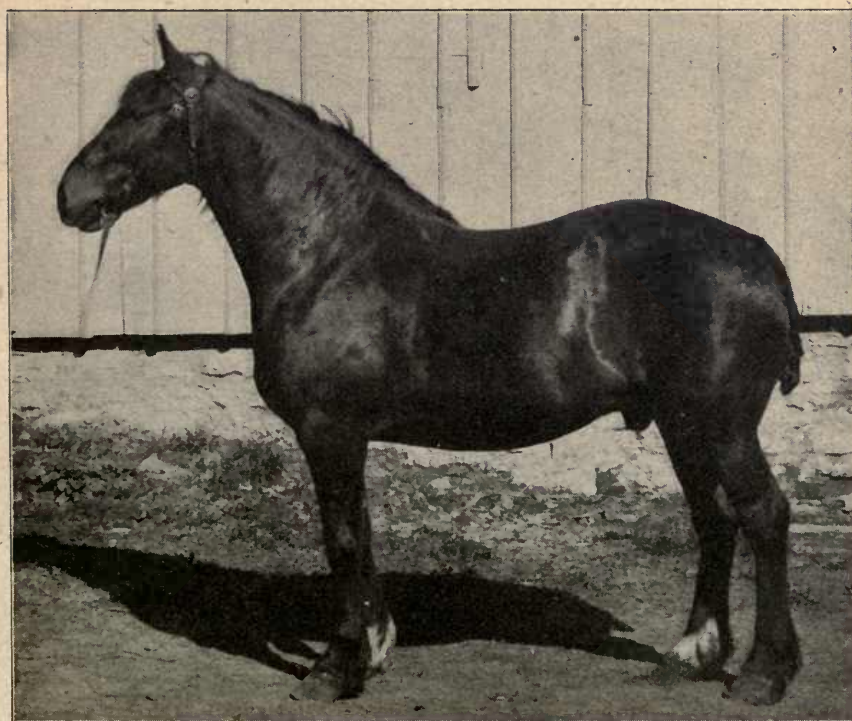


PLATE 4. No. 11. AFTER FEEDING. EXPERIMENT 1, LOT 2.

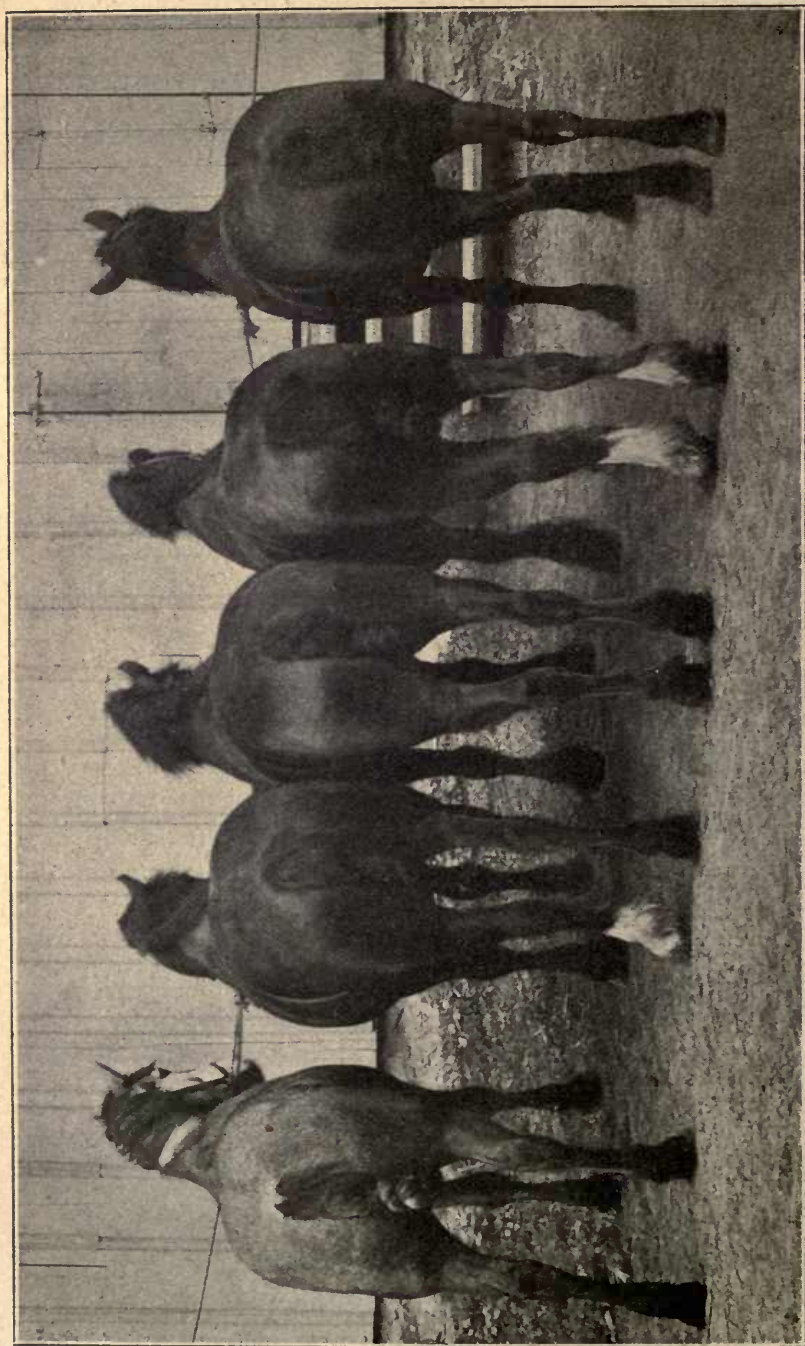


PLATE 5. EXPERIMENT 1, LOT 1. AVERAGE WEIGHT 1537 POUNDS.

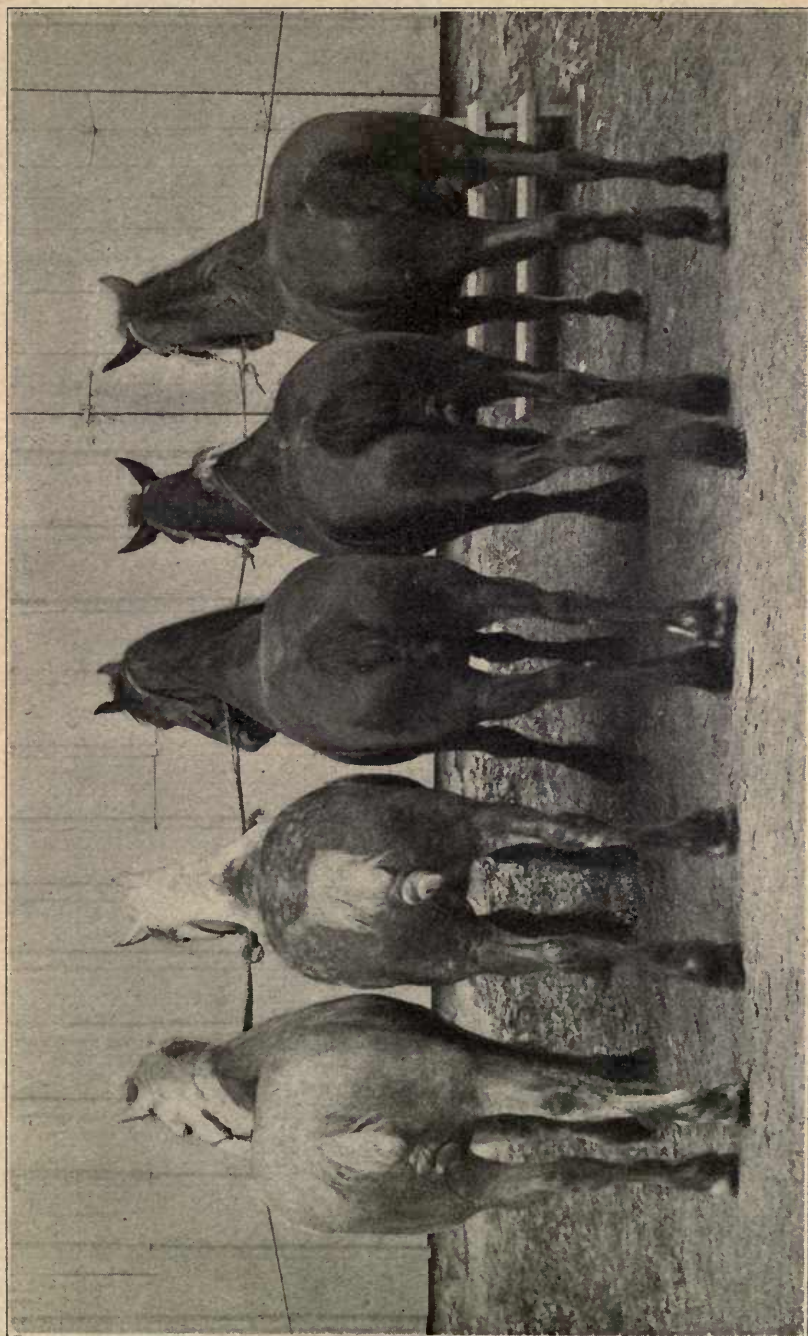


PLATE 6. EXPERIMENT 1. LOT 2. AVERAGE WEIGHT 1606 POUNDS.

NOTE.—The first horse on the left was rejected from the experiment.

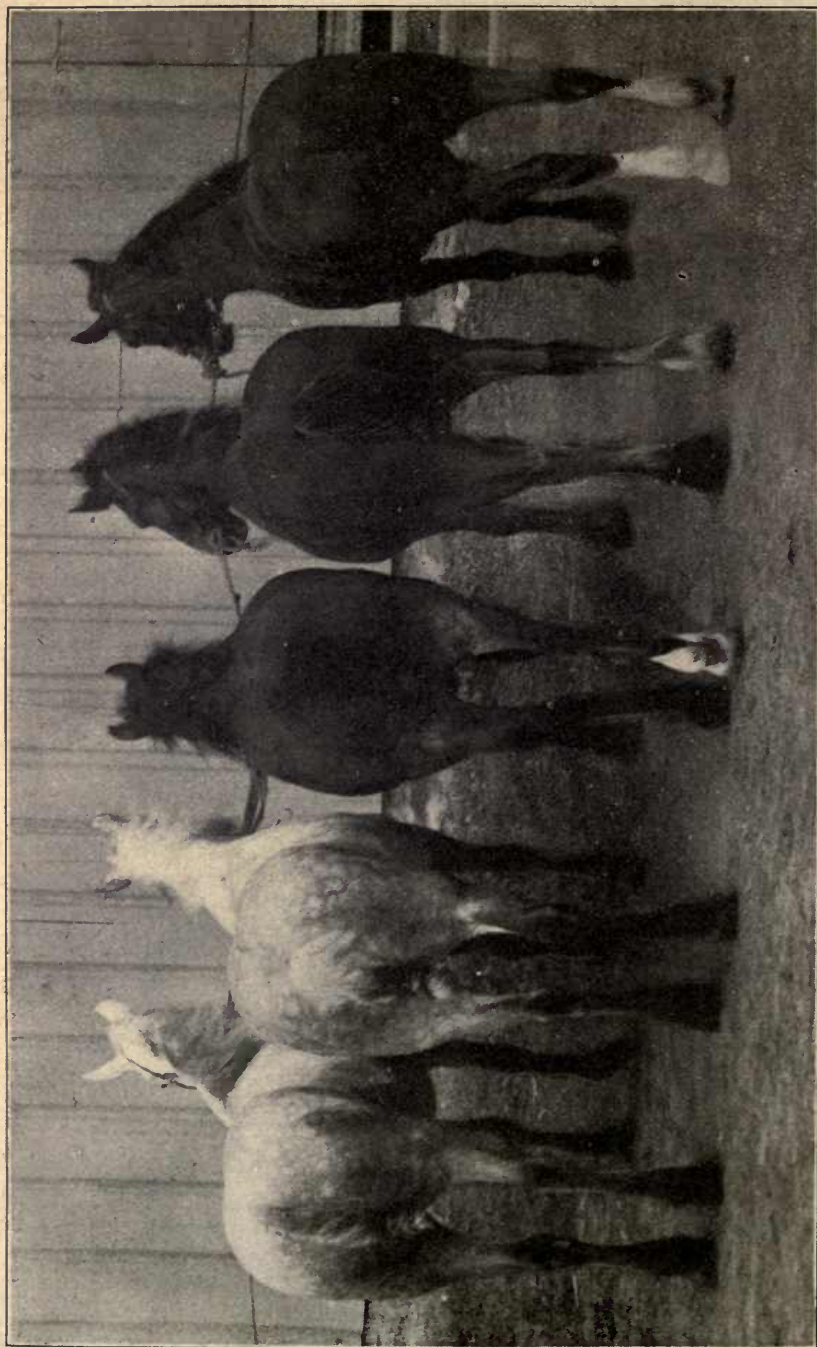


PLATE 7. EXPERIMENT 1, LOT 3. AVERAGE WEIGHT 1477 POUNDS.

NOTE.—The center horse was rejected from the experiment.

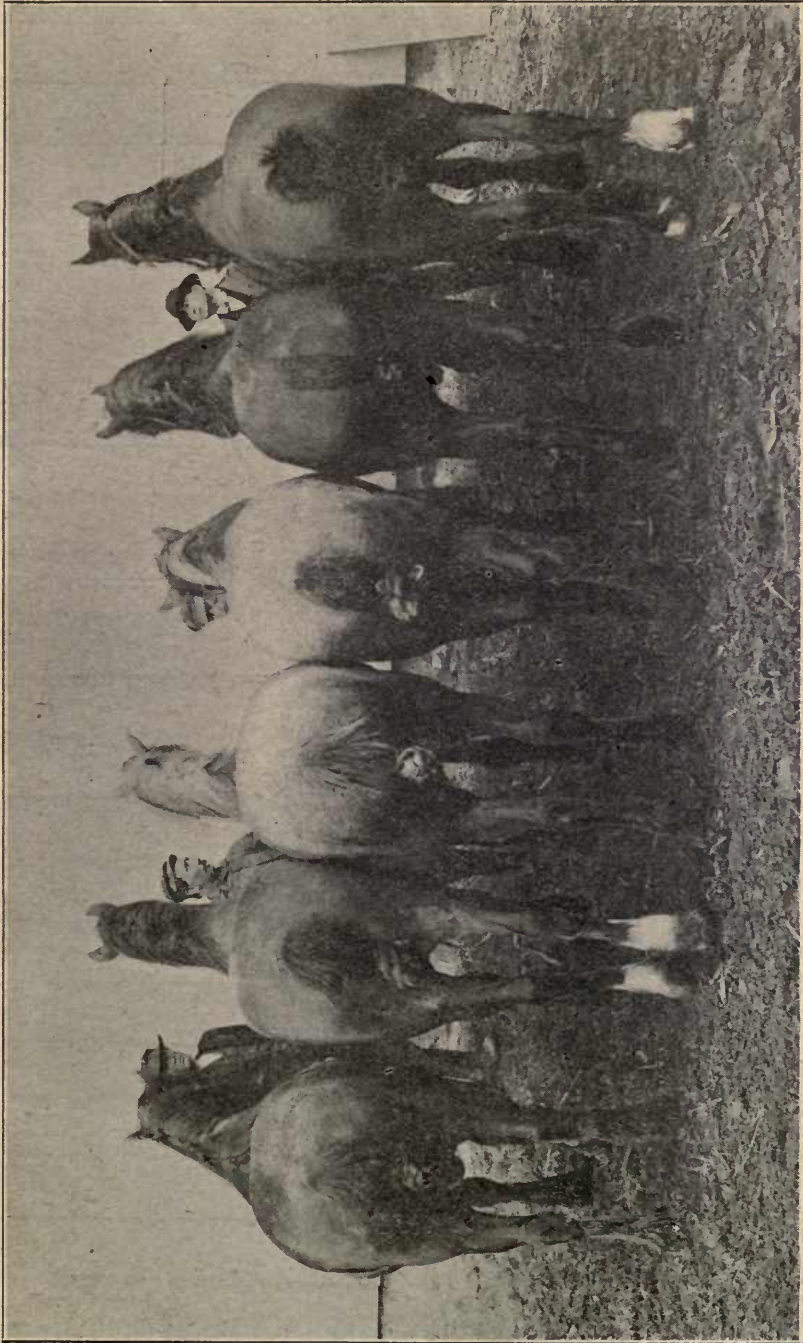


PLATE 8. EXPERIMENT 2, LOT 1. AVERAGE WEIGHT 1674 POUNDS.
NOTE.—The second horse from the left was rejected from the experiment.

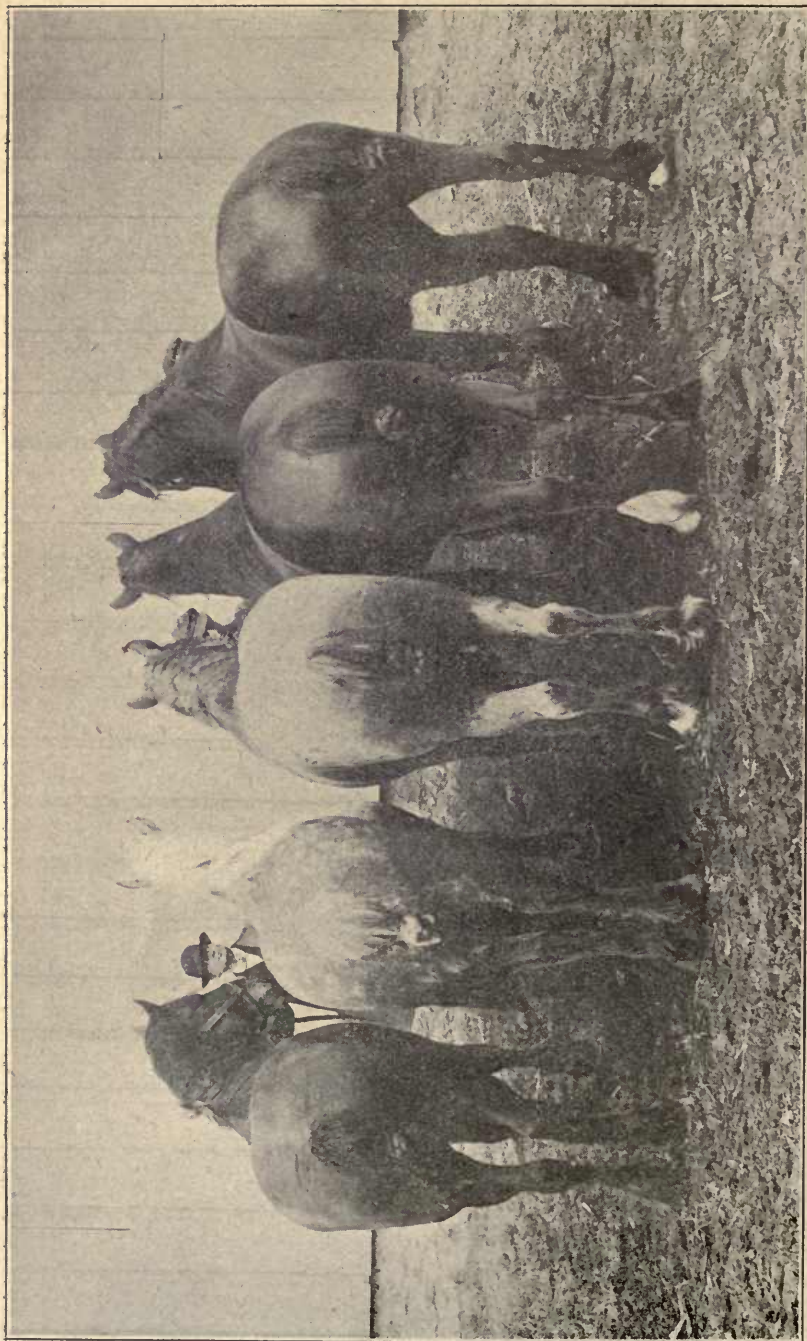


PLATE 9. EXPERIMENT 2, LOT 2. AVERAGE WEIGHT 1734 POUNDS.

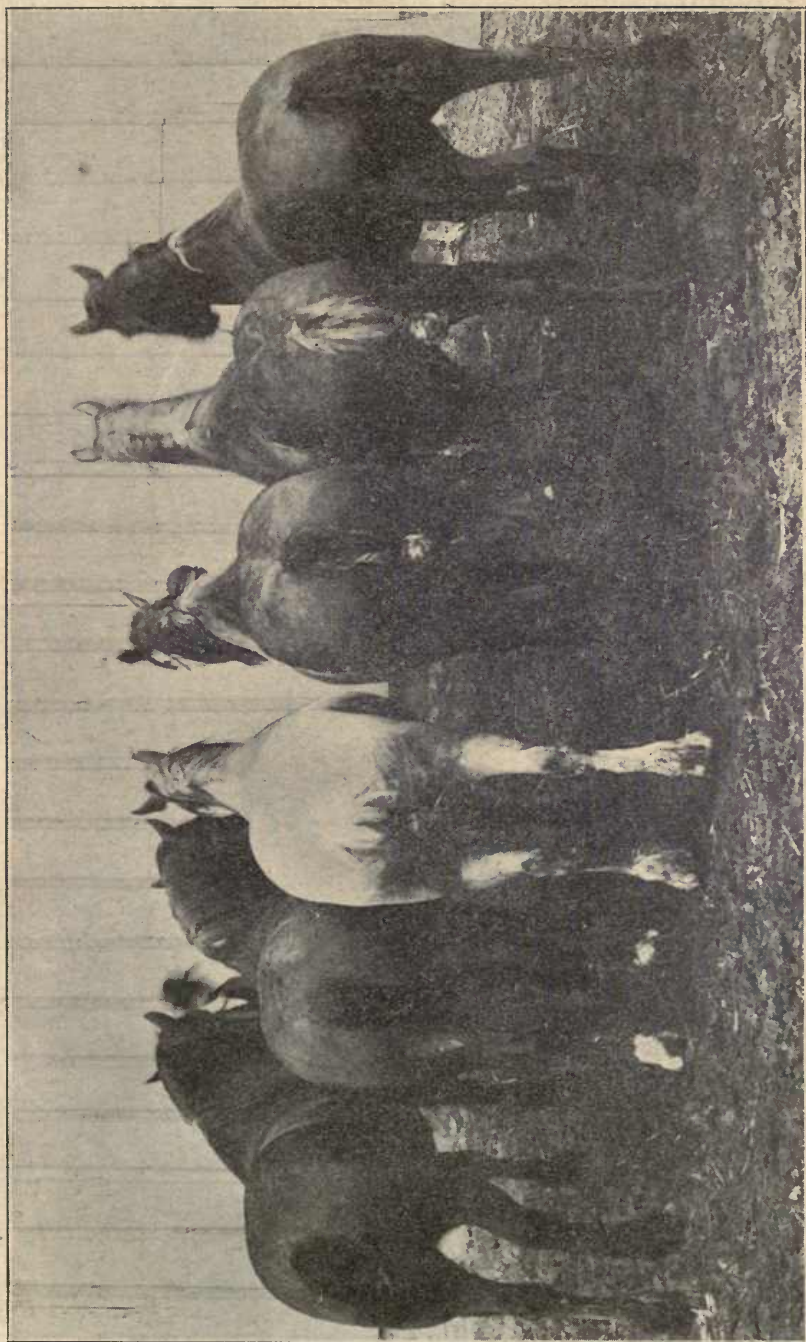


PLATE 10. EXPERIMENT 2, LOT 3. AVERAGE WEIGHT 1736 POUNDS.

NOTE.—The second horse from the right was rejected from the experiment.

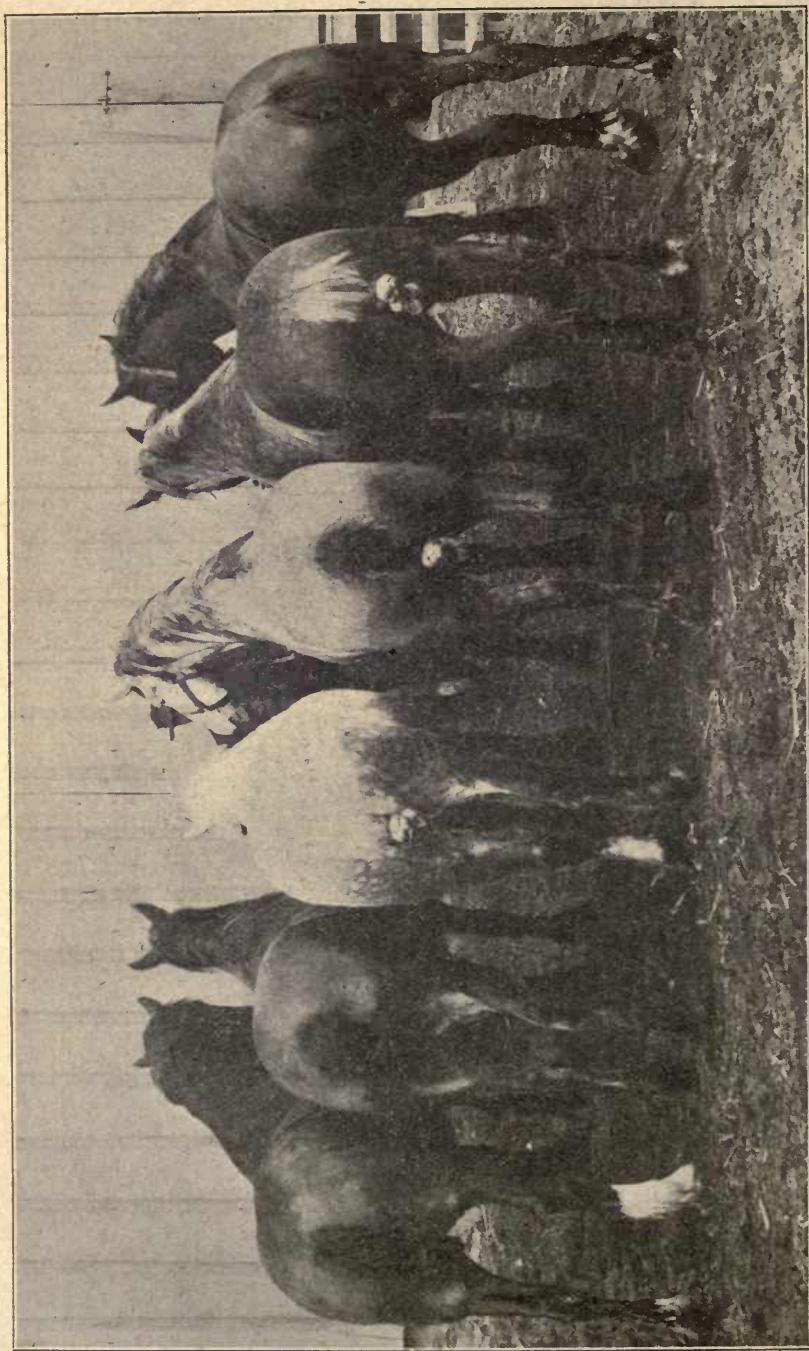


PLATE 11. EXPERIMENT 2, LOT 4. AVERAGE WEIGHT 17 POUNDS.

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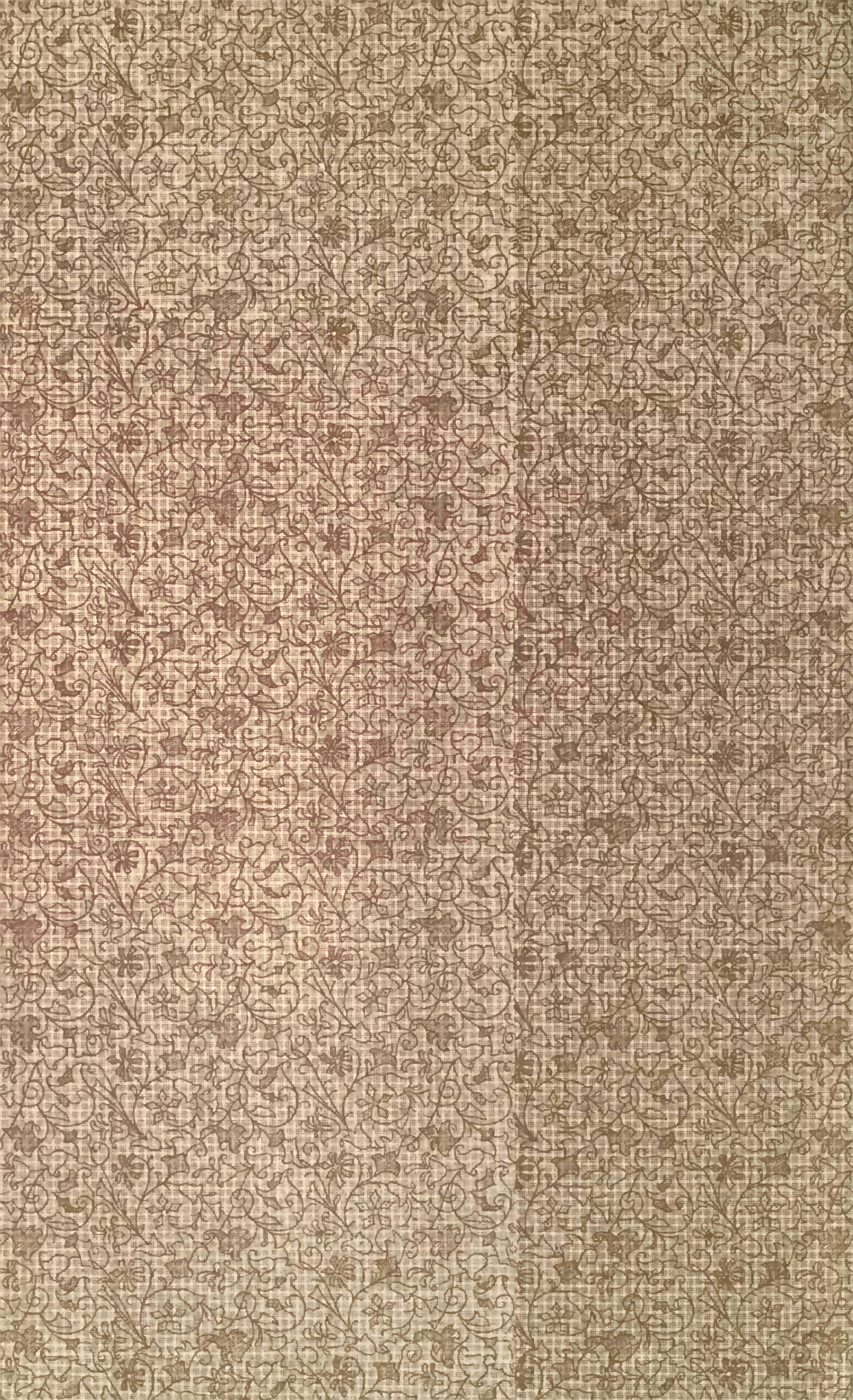
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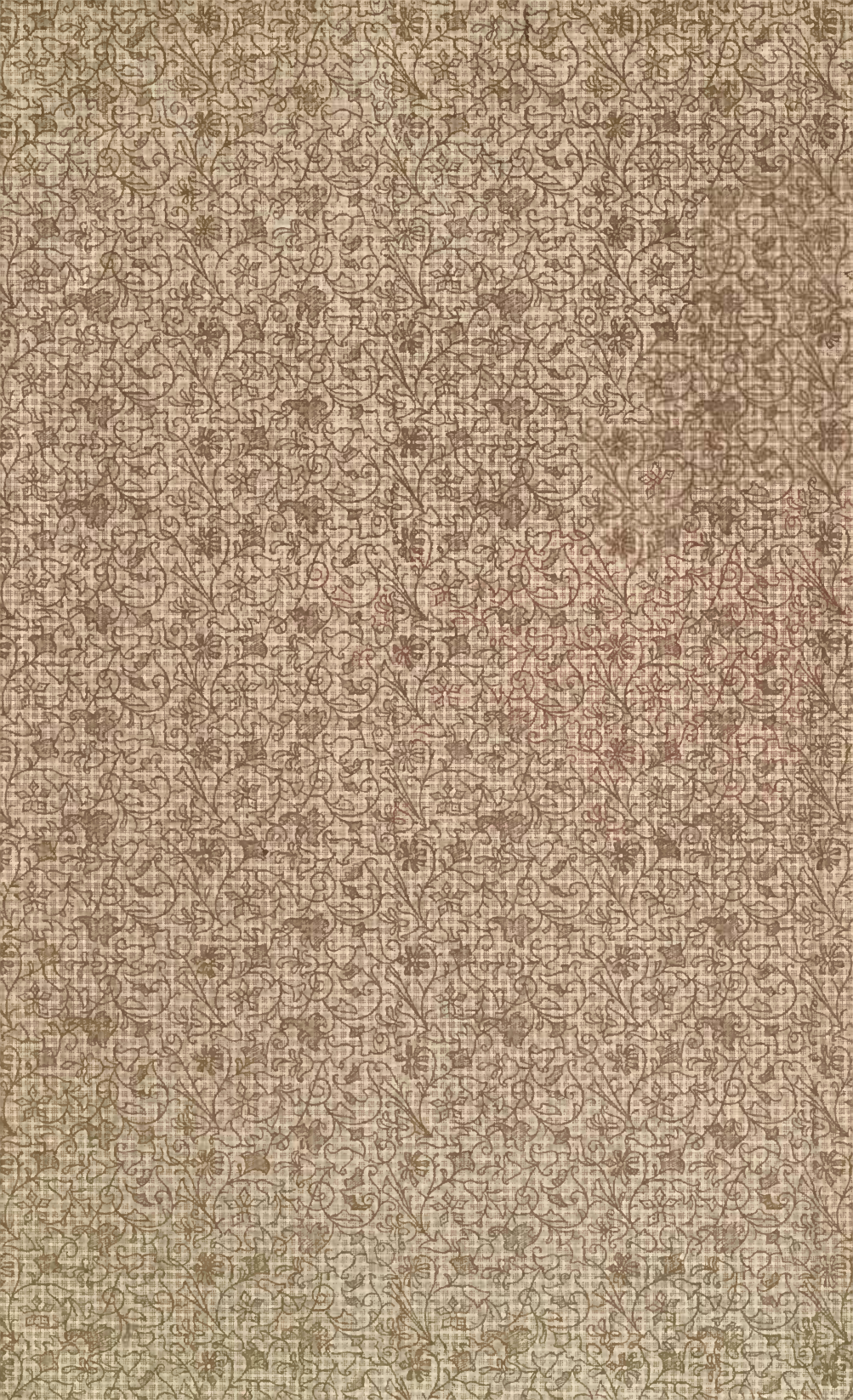
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